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UGV SYSTEMS IN HOSTILE ENVIRONMENTS

International Seminar & Demonstrations
Organised by: INTRA (CEA - EDF - AREVA)
Fontevraud l'Abbaye, France - Sept 23 & 24, 2008
www.groupe-intra.com

UVS CANADA 2008

National Conference & Exhibition
Ottawa, Ontario, Canada
November 4-7, 2008
www.uvscanada.org

UAS CHINA 2008

1st National UAS Conference
Beijing, China
September 25 & 26, 2008
www.csuav.com & www.aviationnow.com.cn
& www.uvs-info.com

This event will take place in new Grand Skylight Catic Hotel and is being organized by International Aviation Group of China, in partnership with UVS International.

- Special session on UAS regulatory issues organised by UVS International.

EUROCONTROL

Innovative Research ATM Workshop & Exhibition
Eurocontrol Experimental Centre
Brétigny-sur-Orge, France - December 2-4, 2008
<http://inoworkshop.eurocontrol.fr>

UAS TAAC 2008

Technical Conference & Exhibition
Santa Ana Pueblo, NM, USA - December 9-10, 2008
Classified Session (US only) on December 11, 2008
<http://psl.nmsu.edu/uav/conference/2008/>

UVS-TECH 2009

3rd International UAS Conference
Moscow, Russia
January 27-29, 2009
www.uvs-tech.ru

This event is being organized by Expo-Ecos on behalf of the Ministry of Transport & Trade, in partnership with UVS International.

- Proposals for presentations, along with a 250 word abstract (MS-Word file), should be emailed to UVS International before 15 September 2008.

ICAUV 2009

1st International Conference & Exhibition
on Autonomous Unmanned Systems
Eagleton Golf Resort
Bangalore, India
April 3 & 4, 2009
www.icauv2009.org &
www.uvs-info.com

The first ever Indian conference dedicated to UAS, ICAUV 2008 will take place at the Eagleton Golf Resort, which is located just outside Bangalore. This event is being organized by the Indian Ministry of Defence, DRDO, ADE, in partnership with UVS International and celebrates ADE's 50th anniversary.

- Proposals for presentations, along with a 250 word abstract (MS-Word file), should be emailed to UVS International before 15 September 2008.

UAS 2009

11th International Conference & Exhibition
Paris, France
June 10-12, 2009
www.uvs-international.org
www.uvs-info.com & www.uas2009.org

Europe's largest UAS conference. The world's principal conference dealing with UAS regulatory issues. Organised by UVS International.

- Proposals for presentations, along with a 250 word abstract (MS-Word file), should be emailed to UVS International before 15 January 2009.

AFTER BAMS WIN, NORTHROP EYES GLOBAL MARKET

By Gayle S. Putrich and Christopher P. Cavas

C⁴ISR, USA

www.c4isrjournal.com

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Now that Northrop Grumman has won the contest to supply Broad Area Maritime Surveillance (BAMS) drones to the U.S. Navy, the company will learn whether the flood of international buyers it expected in the wake of a victory will materialize. Navy officials expect the Australian government - which invested \$15 million to help cover the costs of early BAMS research - to notify them by June or July whether they will participate further in the program. Northrop could build as many as 68 maritime versions of its Global Hawk UAVs, dubbed the RQ-4N. Until now, the Global Hawk has been an Air Force platform used mainly for high-altitude reconnaissance together with manned U-2s. Britain, Canada, Singapore and Japan are considered potential buyers for the Navy version of the Global Hawk, Navy officials said.

The initial \$1.16 billion contract covers delivery of two aircraft plus payloads and control stations in 2011 and 2012, but the selection could be worth much more to Northrop Grumman.

The Navy's long-term spending plan calls for a full fleet of BAMS aircraft to be in place by 2019, with an initial capability in 2015 - five years later than the Navy originally planned. Navy UAV advocates are counting on Northrop Grumman to help them make inroads into the arena of maritime surveillance which has been dominated by manned aircraft.

«This is a huge deal for us,» said Bill Balderson, the Navy's top aviation acquisition official. «It represents the U.S. Navy getting real traction in the UAV world.»

BAMS will serve as an adjunct to the piloted Boeing-built P-8A Poseidon Multi-mission Maritime Aircraft, a 737-800-based, submarine-hunter. Boeing won the \$20 billion P-8 contract in June 2004.

Boeing also competed for BAMS, and it proposed adapting a Gulfstream G550 to fly crewless during deployments and with a crew when the craft needed to fly through airspaces where UAVs are barred. Navy officials said the fact that Boeing is building the P-8 did not affect its decision to select the Northrop Grumman Global Hawk. Lockheed Martin and General Atomics proposed a marine version of the Predator B.

The new drones will be expected to remain in the air for long periods of time monitoring a 2,000-nautical-mile radius. They will deliver battle-damage assessments, conduct port surveillance and keep long-distance watch for Navy forces at sea. Each aircraft is expected to serve for 20 years.

The BAMS award had been expected in early March, shortly after the Feb. 29 Air Force tanker award, but was delayed to ensure the government and its two competitors fully understood each other's position.

«Source selection was delayed twice to gain that understanding,» Balderson said. The competitors were evaluated on technical approach, experience, past performance and cost, in that order, Balderson said.

Global Hawks are expected to eventually replace the U-2s. The Air Force's Global Hawks cost \$27.6 million per copy, compared with an expected \$55 million per BAMS UAV, including its sensors and communications suite, Balderson said.

The Navy will run the BAMS program independently from the Air Force, with a separate mission and program office, although Balderson foresaw «an awful lot of communication and cooperation between the two programs.»

Northrop will provide the airframe and its Multi-Function Active Sensor radar system. Subcontractors include Raytheon, which will provide a turreted targeting system; L-3 Communications, the communications suite integrator; and Rolls-Royce, which will make the AE 30007-H turbofan engine.

Raytheon's Intelligence and Information Systems Division will design and develop the mission control system segment and the flight management system, which provides command-and-control functions.

On its own, Northrop has already kicked off a risk-reduction project that has logged 18 flights and 40 hours of flight testing to look at communications, sensor and bandwidth management systems.

Over the next five years, the Pentagon is expected to spend \$2.3 billion on BAMS research, development, testing and evaluation, and another \$780 million for procurement. However, the acquisition strategy is not yet fully formed.

CANADA TO LEASE NEW SET OF UAVS FOR AFGHANISTAN

C⁴ISR, USA

www.c4isrjournal.com

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Canada expects to strike a deal to lease UAVs for its Afghanistan mission by July as it moves quickly to get the equipment into the field by early next year.

An industry contractor will provide not only the UAVs but the personnel in Afghanistan to launch, recover and maintain the aircraft. The winning firm will be under contract by July 4, with the system deployed to Kandahar no later than February.

The lease program, dubbed Noctua («little owl» in Latin), replaces the Canadian Forces Sperwer UAVs currently operating in Afghanistan. The Sperwers do not have the endurance or range for Afghanistan operations, according to Canadian military officers.

Canadian Defence Minister Peter MacKay said the UAV lease is one key way to reduce Canadian casualties in

Afghanistan. The aircraft will be used to seek out insurgents planting improvised explosive devices and provide surveillance of convoy routes and other intelligence.

Three companies are interested in bidding on the project, which industry officials estimate will be worth about 190 million Canadian dollars (\$186 million). So far, only one, a consortium led by Thales' U.K. unit, has confirmed it will be bidding. Thales, which has offices in Ottawa, is offering the Hermes 450 built by Elbit Systems of Israel. Also part of the consortium is L-3 Communications MAS of Mirabel, Quebec.

Neil Hunter, Thales' business development manager for UAV systems, said the Hermes 450 is a proven capability the firm is providing to British forces in Afghanistan and Iraq. The leased UAVs have flown almost 7,000 hours in those theaters.

The Canadian project does not require the winning company to provide a certain number of UAVs. Instead, it requires enough aircraft to provide a particular capability over a certain period of time. It also requires the aircraft to be capable of remaining 12 hours on station and to gather and transmit high-quality imagery as far away as 100 kilometers from Kandahar.

General Atomics Aeronautical Systems, San Diego, has teamed with General Dynamics Canada, Ottawa, to try to sell the Predator over the last several years to meet Canada's UAV needs. The Predator B is seen as a favorite of Canadian Air Force officers, and last year, the military looked at awarding a sole-source contract to General Atomics for the outright purchase of UAVs. But that recommendation was not acted upon by the Canadian government, as it wanted to see a competition.

John Porter, General Atomics' deputy director of business development for the aircraft systems group, said the company will closely examine the Noctua project before it decides whether to bid.

MacDonald Dettwiler and Associates, of Richmond, British Columbia, is also potentially interested in the Noctua project. MDA has joined forces with Israel Aerospace Industries to offer various UAVs to the Canadian Forces.

CITY VIEWS

Quest for urban radar relies on multiple waveforms

By William Matthews

C⁴ISR, USA

www.c4isrjournal.com

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Radar, an indispensable tool for troops who need to see through darkness and detect enemies through smoke, dust, fog and rain, has trouble functioning effectively where U.S. troops increasingly find themselves operating: in cities.

Buildings, utility poles, trees, vehicles, garbage cans and other urban fixtures can reflect radar signals, scrambling them into an unintelligible mess, said Edwin Chong, an electrical and computer engineering professor at Colorado State University.

Chong and a team of engineers have completed research that could lead to radar systems that can unscramble the urban radar echo chamber. «The goal of our project was to develop radar waveforms and receiving methodologies for doing detection and tracking in urban environments,» Chong said.

Based on his team's research, Chong proposes to build new radars that would be 10 times more effective in cities than those now in use. The new radars would work by using multiple small radar transmitters that are each capable of emitting multiple waveforms. Returning radar echoes would be analyzed and sorted by computers to produce a clear picture of the target and its surroundings.

Traditional radar uses a transmitter to emit a burst of high-frequency radio waves, which bounce off objects and are detected by a receiver. The returning waves reveal that something is out there, and the time it takes them to be received tells how far away the object is. The problem in cities is that radar waves bounce back not just from the intended target, but from whatever else is nearby, Chong said. And radar waves bouncing off the target may then bounce off other objects before returning to the receiver. The result is a cacophony of radar echoes that make it nearly impossible to clearly see or accurately judge distance or movement of the target, he said.

With \$1.6 million from the U.S. Defense Advanced Research Projects Agency (DARPA), Chong's team tackled the problem in three ways. First, they decided that multiple small radar transmitters would work better than a single large one. «If you put up a dozen radars on a city block and collect the information from them and process it, you might get a very accurate picture,» Chong said. Viewing the same scene from multiple vantage points provides a sharper image.

Next, they designed radar transmitters that could each emit a number of different waveforms. Different waveforms provide distinctive echoes when they bounce back from different substances. That way, it is possible to tell whether the returning echo is bouncing back from stone, metal, wood or other material, Chong said. He likened the waveforms to colored lights. When a red light is shined on a target, it reveals the red elements. A green light shows what's green, and so on.

Finally, the Colorado State team compiled «a library of waveforms» for the radar transmitters and algorithms to interpret the echoes. Computer algorithms also determine which waveforms the radar transmitters will emit and when they will emit them, Chong said. Radar returns from all of the receivers are transmitted to a single computer to be processed. One benefit from that is that the radar transmitters and receivers are relatively simple and cheap.

«You can put them on vehicles; you can stick them on walls with self-adhesive pads. They cost very little, so you don't care if the wall gets blown up,» Chong said.

An area to be monitored could be liberally sprinkled with small radar transmitters and receivers. Planted along a city block,

the radars could be kept on continuously for general surveillance, then switched automatically into tracking mode when the system senses that something important has happened, Chong said.

For the DARPA project, the system was designed for use as a fixed device on the ground. But Chong said he is «very interested» in the radar's potential for use in small UAVs. «On a UAV, they could have extra flexibility,» he said. In response to an incident, «you could tell a bunch of flying UAVs to all go chase that truck.»

The Colorado State team's new radar methods were tested by the U.S. Air Force Research Laboratory in Rome, N.Y., and a final report has been submitted to DARPA, Chong said.

The research was part of a multi-project push that DARPA began in 2005 to develop radars that will work better in urban areas. With U.S. troops operating in Baghdad and other Iraqi cities, DARPA's Special Programs Office declared urban areas «a new frontier for radar.»

EXPERTS SEE GROWING USE OF CONTRACTORS FOR INTEL

C⁴ISR, USA

www.c4isrjournal.com

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The use of private contractors to gather intelligence will increase, though it may leave U.S. intelligence agencies weaker, according to speakers at a forum on privatizing intelligence held at St. Mary's College of Maryland in April.

«There may be ups and downs in the sector, but it will grow,» said James Sutton, director of the Transportation Security Administration's Highway Information Sharing and Analysis Center. Governments will increasingly use private contractors as the world becomes more chaotic and less stable because they «really do not have the stomach» for the number of conflicts emerging worldwide.

Contractors are key to the U.S. intelligence community, and those with security clearances help fill work force gaps quickly on short-term projects, said Andrew Richardson, a policy adviser in the Office of the Associate Director of National Intelligence for Human Capital, which looks at personnel issues in intelligence.

«We don't think we can do our job without them,» Richardson said.

After downsizing in the 1990s, the intelligence community, was left with a work force with many employees nearing retirement about the time of the Sept. 11 terrorist attacks. Contractors helped fill that gap.

In June 2006, Richardson's office counted the contractors working in U.S. intelligence agencies, their tasks and costs. A second inventory is now being finished. Though the exact number of contractors working in intelligence is classified, Richardson called the number «stable.»

«We're not alarmed» by the numbers of contractors, he said. Not everyone is so sanguine.

Reliance on contractors for specialized skills is dangerous to the intelligence community, said Stephen Holder, a researcher at the Institute for Defense Analysis and former senior intelligence officer in the CIA.

The CIA and other intelligence agencies have relied too much on contractors to fill temporary gaps, Holder said, «endangering the vitality of the profession» and allowing the National Clandestine Service to avoid rebuilding its core strengths internally. «The National Clandestine Service has lost its ability to be culturally aware of what's going on in a country,» Holder said.

Reliance on contractors for language and other skills that intelligence agencies haven't developed internally could leave those agencies in a lurch if contractors end work for an agency in favor of a more lucrative contract elsewhere.

Holder advocated stricter limits on private companies' ability to hire experienced intelligence officers and then offer them for government contracts.

«What the [Office of the Director of National Intelligence] needs to do is put out a regulation tomorrow saying that any big contractor that goes into the intelligence organization and cherry-picks a journeyman case officer with five to seven years of experience that has all the clearances ... with the lure of doubling their salary and then bidding them back to that same organization within a week, that ought to be outlawed for a minimum of 10 years,» he said.

Richardson agreed that skilled workers are attracted to the higher salaries in the private sector, but he defended the government's hiring of more highly paid private employees.

«These guys are highly skilled and they just won't come work for the U.S. government,» he said. «In those instances, are you paying more? Yes ... but for something you otherwise would not have.»

How contractors are chosen is another concern. That often happens through personal connections and personal agendas, and the process needs to be more impartial, objective and transparent, Sutton said.

GATES CALLS FOR MORE UAVs, FRESH THINKING

By Micheal Hoffman

C⁴ISR, USA

www.c4isrjournal.com

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U.S. Defense Secretary Robert Gates continues to criticize military leaders for what he says is too slow a response to his order to deliver more UAVs and other surveillance systems to Iraq and Afghanistan.

«I've been wrestling for months to get more intelligence, surveillance and reconnaissance assets into the theater. Became

people were stuck in old ways of doing business, it's been like pulling teeth,» Gates said in a speech at the Air University at Maxwell Air Force Base, Ala

Gates has established a service-wide ISR task force to find «innovative and bold» solutions to the shortage. Headed by Brad Berkson, acting principal assistant deputy undersecretary of defense for logistics and materiel readiness, the group was tasked to cut through bureaucratic tie-ups. «My concern is that our services are still not moving aggressively in wartime to provide resources needed now on the battlefield,» Gates said.

A few days later, Gates said Berkson would «look worldwide at all the ISR resources we have. And it's not just ... UAVs. I'm asking him to look at all of the ISR capabilities, piloted aircraft as well as UAVs and so on, and see what we have in the other commands here in the United States and so on.»

He likened the urgency of the task force's work to that of a group he created last year to push for faster production and deployment of Mine Resistant Ambush Protected armored vehicles that are credited with saving lives of troops facing attacks by roadside bombs in Iraq. The new task force will be made up of representatives of the Joint Staff, the military services, the comptroller and the undersecretary of defense for intelligence.

While Gates did not mention the Air Force's Predator UAVs by name, or blame for the Air Force for not getting more of those craft into the field, the secretary chose an audience of Air Force officers for the speech. Earlier this year, he called upon the Air Force to boost the number of MQ-1 Predator orbits to 24 by June. The Air Force reports it is on track to meet that number - a 25 percent increase from last year.

With the Air Force struggling to retrain pilots quickly enough to fly even more Predators, Congress has raised the possibility of the Air Force allowing other officers to pilot Predators. However, Air Force Chief of Staff Gen. T. Michael Moseley shot down that idea, saying he would require all Predator pilots to have first flown other aircraft as long as the UAVs carried munitions. «All this may require rethinking long-standing service assumptions and priorities about which missions require certified pilots and which do not,» Gates said. «For those missions that still require manned missions, we need to think hard about whether we have the right platforms. Whether, for example, low cost, low-tech alternatives exist to do basic reconnaissance and close air support in an environment where we have total command of the skies - aircraft that our partners can also afford and use,» he added.

Gates urged the officers in his audience to dedicate themselves to thinking creatively.

MORE THAN AIRCRAFT

By Ben Iannotta

C⁴ISR, USA

www.c4isrjournal.com

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When intelligence officials hear the word «unmanned,» the phrase «aerial vehicle» fills itself in almost naturally. Maybe too naturally. The lineup for this month's Association for Unmanned Vehicle Systems International conference in San Diego suggests that this reflex might soon be a thing of the past. The industry's pioneers probably never expected the growing variety of unmanned craft on land and at sea when they held their first symposium just as the U.S. chapter in Vietnam was about to slam shut.

During the war, unmanned U.S. aircraft, known as drones, photographed Viet Cong positions without endangering U.S. aircrews. Advocates foresaw a new industry if only they could overcome the Air Force's dim view of planes without airborne pilots, so a group of Air Force officers and contractors in Dayton, Ohio, formed an organization to lead the way.

These days, F-16 pilots are proudly flying UAVs from ground consoles in Nevada, and the Pentagon literally can't get enough of the planes or the trained pilots and sensor operators to control them.

The AUVSI San Diego conference, the largest of the gatherings the organization holds around the world, proves that «unmanned» no longer has to mean aircraft. It could mean things on land, on sea or beneath it. Within those realms could lie the next big ISR revolution, matching the impact of UAVs.

Or maybe the change won't be a revolution so much as a matter of slow, steady progress. «Most people are most familiar with air vehicles. Ground and maritime are growing and growing. They're becoming a much larger part of the show and of the industry,» AUVSI spokeswoman Alysa Reich said.

Attendees at the AUVSI conference will learn about man-portable robots, unmanned ground systems, autonomous surface vessels and underwater vehicles. They will rub shoulders with engineers, marketers and government decision-makers from the U.S. and Europe. They will pick up research papers and hear discussions about all possible unmanned vehicle domains. One paper, from a University of Michigan team, proposes to merge the air and sea domains: «Flying Fish: A Persistent Ocean Surveillance Buoy with Autonomous Aerial Repositioning.»

However, it's fair to say that UAVs remain the conference's anchor for now. Major policymakers are scheduled to be on hand, including German Lt. Gen. Friedrich Wilhelm Ploeger, director of NATO's Joint Air Power Competence Centre, and retired U.S. Air Force Maj. Gen. Michael Kostelnik, the commissioner for air and marine efforts within the U.S. Office of Customs and Border Protection.

Advocates of unmanned craft formed the AUVSI group in 1972 after seeing the value of the unmanned U.S. «drones» in Vietnam. They held their «national symposium» two years later, and this event grew into a series of conferences. In the 1970s, the term «remotely piloted» was preferred over the mindless-sounding «drone,» and so they founded the National Association of Remotely Piloted Vehicles, which they renamed AUVS in 1978. In 1996, they added the «I» to reflect the

industry's growing international flavor. Advocates worked to shoehorn remotely piloted craft into military plans and to win research dollars. The success of that effort is almost unspoken today, and the next big breakthroughs might well be on display in San Diego.

PREDATOR, REAPER TO GET SIGINT SENSORS

C⁴ISR, USA

www.c4isrjournal.com

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Seeking to enhance the capabilities of its medium-altitude UAVs, the U.S. Air Force has asked Northrop Grumman to develop a signals intelligence sensor payload for the MQ-1 Predator and design an expanded version of the sensor for the MQ-9 Reaper. Under an 18-month contract valued at \$54.9 million, Northrop will develop and test the Airborne Signals Intelligence Payload 1C (ASIP-1C) sensor on the Predator. Factory tests are scheduled to be complete in December and flight tests in May 2009, with operational fielding set for 2010. The company will also develop a preliminary design for an expanded ASIP-2C version of the sensor to provide a SigInt capability for the Reaper. ASIP-1C will be a derivative of the ASIP sensor developed for the U-2 spy plane and the Global Hawk UAV, the company said. The company said ASIP-1C will deliver enhanced communications intelligence collection and exploitation capabilities in support of Predator's hunter-killer-scout mission. The ASIP industry team includes Northrop Grumman as prime contractor for sensor development; General Atomics, which builds the UAVs; and Raytheon for the ground station interface.

RUSH TO THE SKY

U.S. Army quickens the place of its new UAV program

By Erik Schechter

C⁴ISR, USA

www.c4isrjournal.com

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In June 2007, General Atomics flew an early version of the Sky Warrior Predator derivative for the first time. That was good timing from the perspective of its customer, the U.S. Army, because barely a month later U.S. Defense Secretary Robert Gates would order a surge of intelligence and targeting equipment into the field.

The Army, which had fought hard to build a fleet of aircraft similar to the Air Force's Predators but under its control, reacted quickly. Managers overhauled the Sky Warrior development plan to take a year off the schedule.

The first results of that push came March 31, when General Atomics flew the first production version of the aircraft from its site in Adelanto, Calif. If all goes as planned, by the summer of 2009, U.S. Army teams in Iraq will be viewing Sky Warrior video feeds on their laptops and sharing targeting data with AH-64 Apache helicopters with no aid from the Air Force.

«Basically, we will be rushing out two platoons of Sky Warriors to Iraq,» said Col. Robert Quackenbush, deputy director of the Army Aviation Directorate. «The first one will be fielded in the summer of 2009, and the second in the spring of 2010.»

Of course, the idea of the Army contracting for its own Predator-like fleet has been controversial. The Air Force has argued that a separate Army fleet would be redundant, and in 2006, the U.S. Government Accountability Office (GAO) summarized the debate for Congress. The GAO noted the Army's contentions that it was not getting sufficient UAV support from the Air Force. Army officials, according to the GAO, believed the Air Force Predator «operationally and technically mismatched with Army needs.» They wanted their own version, and that is what's underway, though so too are efforts to bring order to the UAV acquisition programs.

In the case of Sky Warrior, picking up the pace has required compromises and work-arounds to address the technical risks that Army officials know could be lurking. The system is so new, for instance, that extra precautions must be taken to ensure reliable communications links to the planes. In addition to a tactical common data link for the Sky Warriors, commanders will keep backup General Atomics proprietary data links on hand «if we run into trouble,» Quackenbush said.

The Army has also tweaked the deployment scheme for the aircraft. The service initially planned to dispatch Sky Warrior in «systems» of 12 aircraft. To turn out the Sky Warrior a year early, each system will now consist of four aircraft.

The Army plans to retain its testing rigor as much as possible. The aircraft and its ground control station will need to pass a limited user test in March 2009, said Don Cattell, director of Army programs within the Aircraft Systems Group of General Atomics. Cattell said he's not worried. «The Sky Warrior developmental program has gone extremely well,» he said. «We have total confidence that this great system will meet or exceed the invited user test requirements.»

The Army-Air Force Game

The Sky Warriors share the MQ-1 airframe with the Air Force's Predators and Reapers, and discussions are underway among Air Force and Army officials about merging all MQ-1 aircraft into a single acquisition program. Each service's versions would carry different payloads tuned to their specific missions and operating environments.

Representatives from the Army and Air Force program executive offices have signed an agreement pledging that they will develop a plan to combine efforts into a single MQ-1C program and contract. The plan is scheduled to be presented to the Office of the Secretary of Defense soon, Quackenbush said.

Merging the Predator and Sky Warrior programs was always on the agenda, but Gates' increasingly strident calls for more intelligence and reconnaissance equipment and flights has sped things up.

The Army likes the idea of merging the programs. «As we ready the quick reaction capability, we will also be accelerating the merging of the two programs,» Quackenbush said. «We believe that this combined effort will yield useful synergies.» The Army intends to make the Sky Warrior's ground control stations interoperable with those of its other unmanned aircraft, and someday possibly the Air Force's Predators and Reapers.

«We are working to make the One System ground control station fully interoperable with the Shadow and Hunter systems also,» Quackenbush said. «The long-term goal is to make it fully interoperable with the Air Force's Predators and Reapers so that the Army will be able to get, via data link, the video of any medium- or high-altitude UAV in theater.» However, it is still unclear whether the Air Force would allow the Army to control Air Force drones.

Predator vs. Sky Warrior

Sky Warrior resembles the MQ-1 Predator, but it is slightly larger, with a wingspan of 56 feet and a length of 28 feet. In addition, the Sky Warrior can carry four Hellfire missiles compared to Predator's two. The Sky Warrior also comes with a deicing capability, a crucial feature given that Predators have crashed in Afghanistan in bad weather. Another change: The drone is equipped with the Aerial Common Sensor of the ARH-70 Armed Reconnaissance Helicopter.

The Army plans to use the Sky Warriors to replace older drones such as the RQ-5A Hunters. The new planes have a range of 300 kilometers and can remain in the air for a day and a half. They also pack a full complement of electro-optical cameras, infrared sensors, cloud-piercing synthetic aperture radar and communications equipment.

Combat brigade commanders down to platoon level will be able to tap into this «eye-in-the-sky» by way of a One System Remote System Video Transceiver built into strengthened laptops. The Sky Warrior «helps [troops] identify unfriendlies, IEDs, roadside weapons, etc., assisting patrols in staying ahead of movement,» Cattell said. «It also enables manned-unmanned teaming, with sharing of communications from the [ground control stations] to the soldiers on the ground or in other aircraft»

Finally, a major difference between the two aircraft is how their respective customers operate them. The Air Force controls most of its Predators from Creech Air Force Base, Nev., via satellite, though the craft are launched and recovered by teams in the battle zones.

«The Air Force depends almost exclusively on remote, [split operations] satellite capabilities to control its Predators,» Quackenbush said. «We're more flexible.» The Army plans to make greater use of ground-based UHF/VHF radio relay and C-band data links for Sky Warrior.

Making a fast delivery

The initial Sky Warrior contract, inked in August 2005, had General Atomics promise to supply the Army with 17 drones and seven ground control systems at a cost of \$214 million. But Cattell says that the «entire program is expected to reach over \$2 billion, with current approved follow-on delivery encompassing 11 systems.»

If Sky Warrior succeeds, it could make good on another Army program that failed. Funding for Sky Warrior will come from the now-defunct RAH-66 Comanche project, which was nixed in February 2004. The stealth reconnaissance helicopter lost favor, in part, due to the development of armed, unmanned drones.

WAR MACHINES

The U.S. military soon could be an army of fearless robots controlled, if at all, by humans far from the conflict. Mark Herman and Art Fritzson of Booz Allen Hamilton explore the profound effects such a development would have on the nature of warfare and the culture of the U.S. armed forces.

C⁴ISR, USA

www.c4isrjournal.com

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The annals of warfare are replete with technological innovations that brought lasting change, altering the balance of geopolitical power the introduction of submarines and machine guns during the U.S. Civil War, aircraft and chemical weapons in World War I, and radar and the atomic bomb in World War II. But the conflicts in Iraq and Afghanistan show evidence of what could well be the most profound change in military history.

For the first time since the earliest antagonists went at each other with sticks and stones, the U.S. military is on the verge of what might be called no-fear warfare - with human combatants replaced by mechanical robots manipulated by people thousands of miles distant. Military robots already are being designed and deployed to perform an array of disagreeable tasks, including forward reconnaissance, stopping and questioning suspicious individuals, and launching artillery. They are being built to navigate rough, hostile terrain, to creep along the ground, patrol waters and skies, and climb up the sides of buildings - all without drawing salaries or objecting to multiple tours of duty.

But what makes military robots profoundly different from human soldiers is that they are incapable of fear - the one battlefield constant since the dawn of history, implicit in the writings of every military theorist since Sun Tzu. Strange though it may sound, within a decade or so, the world's most advanced military could largely eliminate fear as an accompaniment to doing battle - for individual combatants as well as for generals and political leaders charged with

deciding how and where to commit their forces a set of programmed instructions. An army of robots could be the ideal way to combat fanatical insurgents, including suicide bombers, and it could be a force multiplier against a more conventional enemy. The best-equipped, most physically fit jet pilot, for example, can withstand an acceleration force of about nine Gs - that is, nine times the force of gravity at sea level. With no human aboard, an advanced jet fighter could easily withstand 16 Gs, giving it unprecedented ability to turn, dive and climb.

Robots under development have the potential not just to fire upon an enemy, but also to defuse mines and roadside bombs. Shallow sea beds have long posed a problem for sonar and radar because rocks, reefs and other jagged formations can make it difficult for them to pick out an enemy mine or submarine. For tiny submersible robots crawling along the ocean bottom, such tasks might be routine.

To date, there has been little discussion of the far-reaching cultural and political implications of a robotic military. The advent of robotic warfare cannot help but affect the basic character, structure and practices of the armed forces. Indeed, the U.S. military's very soul could be at stake. What kinds of people might be suited and attracted to military life in this brave new world of no-fear combat? What kind of leadership and training will be needed, and, on a more philosophical level, what's to become of such timeless military values as courage, valor, honor and self-sacrifice? Would these concepts still have meaning in a military in which only the enemy's lives would be at risk?

These are but a few of the questions and concerns that surround the prospect of a robotic military. What will happen when increasingly sophisticated robotic technologies allow the U.S. armed forces to wage war without putting its human soldiers in harm's way? And, most frighteningly, what if some foreign military power backed by superior engineering talent manages to assemble an advanced robotic force before the U.S. does?

The era of no-fear warfare lies just over the horizon. The technology is progressing rapidly, and its appeal is apt to prove irresistible. Within one to two decades, it is likely that our military front line will be dominated by an array of high-tech gizmos, with increasing ability to move and act autonomously. When that happens, on whom will we pin medals - and whom will we hold accountable when something goes wrong?

The U.S. already has deployed a few thousand robots, chiefly UAVs, in Iraq and Afghanistan, and many more ingenious devices are on the way. By 2010, a third of all U.S. deep-strike aircraft likely will be unmanned and, by 2015, Congress insists that a third of U.S. ground combat vehicles be unmanned, as well. When fully developed, these robots will be ideal for what militarists call «3-D work» - tasks that are dirty, dull and dangerous, which describes a great deal of what military forces do. Some robots will be as large as trucks or planes, others as small as dust mites, which may invite troubling comparison with chemical and biological warfare. South Korea already is considering deployment of a fully armed, Samsung-built sentry robot. Because the SGR A1 robots are unaffected by severe weather and fatigue, Samsung says, «the perfect guarding operation is guaranteed.» You can see the SGR-A1 in action on YouTube. Search for «Samsung robotic sentry.»

Will future robots think and act of their own accord as they do in movies such as «Star Wars» and «The Terminator»? At the moment, most military robots are in a first evolutionary phase in which, like puppets, they are under direct human control - although some have semi-autonomous traits. It is almost inevitable, however, that military robots will gain increasing autonomy - first, because advances in artificial intelligence will permit it; second, because the sheer number of robots likely to be deployed will challenge the ability of human controllers to remain hands-on; and third, because any network-centric approach to controlling robotic forces eventually could invite enemy hacking.

As with any new technology, it also is predictable that accidents will occur and innocent people will be harmed before the advent of no-fear warfare. When that happens, military and civilian authorities, not to mention tort lawyers, will face the challenging prospect of assigning blame for any deaths or injuries. Such developments will not, of course, be confined to the armed forces. Writing in Scientific American in December 2006, no less a seer than Bill Gates predicted that robots were destined to become a «nearly ubiquitous part of our day-to-day lives.»

Gates' article compares the present-day state of the robotics industry to that of the personal computer 30 years ago. Indeed, robots offer vast potential for increasing convenience and creating wealth. Few would object to robots taking on dangerous, repetitive tasks, helping the infirm get in and out of bed or even walking the dog on a rainy day. But there's a hitch where the military is concerned, and it's a big one: The introduction of increasingly effective, increasingly autonomous military robots may threaten the values and esprit de corps that always have bound together troops and for which our fighting forces are justly celebrated. Can military culture and the military's basic operating model survive the advent of no-fear warfare? Possibly, but not without substantial changes.

Some early signs of strain already are visible. For example, many of the pilots who control UAVs in Iraq and Afghanistan are stationed in the U.S., where they are safe from harm and routinely go home at night to their families. Nonetheless, some of these desk-bound pilots have claimed to suffer post-traumatic stress disorder as a result of what they've witnessed on their computer monitors; some are even clamoring to receive combat decorations. One veteran who recently returned from Iraq says such claims are stirring active resentment among the «boots on the ground» who must endure daily artillery fire and the risk of attack by improvised explosive devices.

Band of Brothers

At the heart of our basic military model is a set of assumptions known to every general, every drill sergeant and every grunt who survives boot camp. Fanatics and psychopaths aside, few people take naturally to armed conflict. In other circumstances, faced with the terrifying prospect of face-to-face combat, many people would simply turn and run.

Armies throughout history have learned to counter this most human of instincts by carefully instilling their troops with a close band-of-brothers camaraderie. Drill sergeants are famously adept at molding recruits into an effective fighting force, not by preaching righteous abstractions at them but by instilling a sense of mission and fostering strong ties of loyalty among fellow troops. By the same token, every good general and every good platoon leader shares the same basic goals upon entering battle: to subdue the enemy forces with minimal loss of their own troops' lives.

With robots replacing people in battle, a fundamental shift in needs and priorities will occur. Rather than technology supporting human combatants, it will be the other way around. The military will need more people with the talent and experience to devise and maintain robotic forces and many fewer - or perhaps none at all - who exhibit the classic traits of a warrior. In other words, the ideal military recruit may come to resemble Bill Gates more than Audie Murphy or Rambo. Or if not Gates, how about a 12-year-old Doritos-munching couch potato who happens to be an ace at playing video games?

In truth, there may be little real difference in the skills required to master a computer game and those required to fly a UAV. Every middle-class parent knows that children born in the computer age far exceed their elders when it comes to electronic gamesmanship. The arrival of military robots, therefore, coincides with a generation of young people whose thumbs and fingers can manipulate the controller of an Xbox or PlayStation with amazing dexterity and confidence.

Moreover, it is often observed that those born in the age of computers, video games and BlackBerries have an unusual facility for multitasking - possibly at the expense of acquiring better face-to-face interpersonal skills and deeper analytical capacity. What could be more adaptive for an age of video-controlled military hardware?

A robotic military model has important implications for recruitment and staffing. When the role of military technology is mainly to support human warriors, it shares many operational characteristics with the industrial manufacturing model: Mass-production of technology allows the military to maintain an effective fighting force despite an ever-changing roster of human combatants. When guns displaced the bow and arrow in the 13th century, for example, it was not because they were more accurate or deadly. Armies first took up guns because they were easier to produce than bows and arrows and because a soldier could be trained to fire one in about half an hour, whereas a good archer might take years to master his weapon.

But consider the nature of a military in which people's primary role is to support the technology, not the other way around. Such a military would demand increasing levels of technical expertise, rendering the idea of a two- or three-year tour of service unthinkable. Once trained, good military roboticists would be much too valuable to let go.

One option might be outsourcing. The military always has relied on the private sector for specialized technology - for designing and building its fighter jets, for example. Because robotic warfare will require intense technological expertise, might we eventually outsource combat operations to companies such as Microsoft, Google or Electronic Arts?

More frightening to contemplate is the possibility that our military's most iconic and enduring figure - the drill sergeant - might become extinct. After all, with human soldiers no longer needing to engage in armed combat, why prepare them for it? Just as muscles tend to atrophy when they go unused, it is conceivable that after a long, successful period of a robotically oriented military, our knowledge of how to organize, train and motivate people for combat could evaporate.

Ethics and Pragmatism

The ethical implications are, of course, profound. The automaton that acquires human consciousness and then turns hostile toward humanity has been a staple of popular entertainment since Czech playwright Karel Capek coined the word robot in his 1921 drama, «R.U.R.» (Rossum's Universal Robots). In 1942, Isaac Asimov, the prolific science-fiction author, introduced three rules that builders of all robots in his stories would have to obey:

- 1) A robot may not injure a human being or, through inaction, allow a human being to come to harm.
- 2) A robot must obey orders given it by human beings except where such orders would conflict with the First Law.
- 3) A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

As an example of life imitating art, South Korea's Ministry of Commerce, Industry and Energy says it might draw upon Asimov's rules in issuing formal ethics rules for the manufacture of non-military robots, the BBC reported in March 2007. But rules can be broken. Some roboticists say we are only 10 to 15 years away from having robots that can think and learn like humans. And as robots acquire self-learning mechanisms, said Gianmarco Veruggio of Genoa's Institute of Intelligent Systems for Automation, their behavior will become impossible to fully predict. Noel Sharkey, a professor of artificial intelligence and robotics at the University of Sheffield, asserts that robots' autonomy will make them different than other weapons systems. «We are going to give decisions on human fatality to machines that are not bright enough to be called stupid,» he said.

It is also worth contemplating the effect a no-fear robotic army would likely have upon an enemy. Any human foe faced with the impossibility of confronting and defeating any live soldiers on the field - after all, what glory or satisfaction would there be in killing a robot? might be all the more tempted to adopt terrorist tactics that strike directly at civilians. In the long run, therefore, a no-fear military has the potential to simply transfer fear from the battlefield to society at large.

These considerations notwithstanding, the U.S. military has little choice but to continue its aggressive pursuit of robot technology - because of its potential to spare the lives of U.S. soldiers, because of the enormous advantages that will naturally accrue to the first-mover in robot technology, and because allowing any other military power to get there first would be unacceptable.

And as with the atomic bomb, the introduction of robotic, no-fear warfare is all but certain to spur an intense global arms



race. As that happens, the greatest threat to continued U.S. military leadership would come not from insurgent extremists but more likely from any nation with the commitment and discipline to educate and train a superior work force of robotics scientists and engineers.

BEYOND NEURON
Italians View UCAV Effort as Path to Emerging Joint Programs

By Tom Kington
Defense News, USA

www.defensenews.com

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Industrial officials planning Italy's contribution to the pan-European Neuron unmanned combat aerial vehicle (UCAV) program are also focusing their attention on subsequent joint programs that may emerge in Europe.

Launched in 2003 by Dassault and backed by French state funding, Neuron was pitched as a European technology demonstrator that would fuse know-how on the continent in a unique UCAV working group. Countries including Greece, Italy, Sweden, Switzerland and Spain signed up, but not Germany or the United Kingdom.

Alenia Aeronautica, which runs Italy's input, has never stopped working on UCAV related technologies separate from its contributions to Neuron. And now managers have spoken about where those technologies might be used.

«Neuron cannot be considered a truly European program without Germany and the U.K., both of which are investing heavily,» said Alessandro Amendola, Alenia's strategic business development manager.

«We are on two fronts and it is not clear what the future will be, but we need to be ready for it,» he added. «As well as working closely with the Neuron partners, we are also thinking of a role in a possible post-Neuron program. Alenia needs to have the technology to guarantee that role, so while Neuron is about working on a certain part of the technology, and where every-one sticks within their own responsibility, we need to be doing everything.»

Alenia has been testing UAV technologies on its Sky-X and Sky-Y demonstrators, and thinking ahead to two medium-altitude, long-endurance products for the market, starting with the Molynx, a civilian UAV with a 25-meter wingspan, 800-kilogram payload, a maximum altitude of 45,000 feet and 30-hour endurance.

The Blacklynx, a twin diesel-engine military UAV with armaments held under the wing, would boast a 25-meter wingspan, 800-kilogram payload, a maximum altitude of 45,000 feet and 36-hour endurance. «These two programs are still being evaluated from a technical and business point of view,» Amendola said.

Sky-X tests include automatic takeoff and landing, as well as an autonomous attack capability that forms part of its area of responsibility on Neuron. Other capabilities set to be tested on the platform, which has made 25 flights since its debut flight in 2005, include in-flight refueling and data exchange with other platforms.

Measuring 6.94 meters in length with a wingspan of 5.78 meters, the Sky-X has a take-off weight of 1.45 metric tons, a maximum altitude of 25,000 feet and can fly for two hours. While most of Sky-X's flights have taken place at the Vidsel test flight center in Sweden, the UAV has been flown 10 times from the Amendola air base in southern Italy, where the Italian Air Force stations its Predator UAVs and where it has struck a deal with Italy's civil aviation authority to carve out flight zones for UAVs. «We are flying the Sky-X out of Amendola base, but since we make alterations to the platform for every flight, we need a new flying permit every time,» said Riccardo Barzan, head of UAV development. «It is the same at Vidsel, but there it takes a few hours to get the permit; here it takes longer.»

Enlarged UAV Flight Corridor

Italian authorities have recently extended the UAV flight zone, creating a corridor from Amendola air base, on Italy's east coast, out over the Mediterranean where it heads south, following the coastline all the way around the toe of Italy to the island of Sardinia off Italy's west coast. The corridor ends at the Italian military test range of Salto di Quirra in Sardinia, where plans are afoot to build a runway to land UAVs.

Apart from offering ample testing opportunities for UAVs and linking to air bases, the corridor could also offer a handy flight path for the planned use of UAVs to monitor vessels containing migrants heading for Italian shores.

Surveillance is a key technology on Alenia's second flying UAV, the Sky-Y, which is 9.7 meters long with a wingspan of 9.9 meters. It has a 76-centimeter antenna for satellite navigation, a maximum takeoff weight of 1.2 metric tons, a payload of 150 kilograms, a maximum altitude of 25,000 feet and 14-hour endurance.

After making its debut flight in 2007, the Sky-Y is undergoing a series of tests and enhancements, starting with its diesel engine. «We need a two-stage, turbocharged diesel to get it to 30,000 feet,» Barzan said. The new engine will be integrated alongside a new wing, with first flights in 2009 or early 2010, he added.

Autonomous target recognition will also be tested in 2009, while this September will see the first flight with the EOST45 electro-optic sensor built by Selex Galileo, which is meanwhile marketing its own Falco UAV. Selex Galileo and Alenia Aeronautica are both units of Finmeccanica, the Italian industrial group. Using an infrared camera to assist the ground control station, the Sky-Y has made low-light takeoffs, while next year, autonomous taxiing will be tested using sensors and GPS.

EUROPEAN BATTLE **4 Partners Challenge EADS' Advanced UAV** **By Pierre Tran** **Defense News, USA** www.defensenews.com **June 9, 2008**

An unsolicited offer to France and Spain for an unpiloted spy plane from a consortium comprising Dassault Aviation, Israel Aerospace Industries (IAI), Indra and Thales would cost 30 percent less than a rival system from EADS, an executive from the four-strong group said.

A battle royal rages between EADS and the four companies competing to win orders for a theater-wide drone. EADS Germany is determined to win funding for its multi-mission Advanced UAV, which combines surveillance and reconnaissance tasks.

An offer was made to the French and Spanish authorities by the four companies on May 22. The offer was a binding one, covering price, performance and delivery.

A European medium-altitude, long-endurance (MALE) surveillance UAV from the four-nation industrial group would cost about 1 billion euros (\$1.6 billion) less, or about 30 percent, than EADS' planned Advanced UAV, the executive said on the side-lines of a June 6 news conference held by chief executives of the four companies.

An EADS spokesman said the company made an offer to France, Germany and Spain earlier this year on the Advanced UAV, with a first delivery in 2015, in line with the customers' requirements.

«We are absolutely convinced that only the Advanced UAV will meet all the requirements which the three customers have expressed,» EADS said in a statement. Other proposals «were falling short behind expectations of our customers,» the company said.

Development cost of the Advanced UAV would depend on final requirements, and EADS is in talks with the customers to determine this, the company said.

IAI Chief Executive Yair Samir said the Israeli government had supported development of the Heron TP unmanned aircraft, the platform for the European UAV system. «We have invested \$1 billion in development,» he said. The development is paid, and there is a ready-made product due to enter service with the Israeli Air Force in 2009, Samir said.

Acquiring the Heron also opens the door to cooperation between the Israeli and French air forces, Samir said. IAI took a robotics approach in designing the UAV and has had wide experience in integrating unmanned aircraft into civilian airspace, he said.

The sunk cost of development means the European UAV would be cheaper than EADS' competitive product, the first industry executive said. Thales was able to beat Northrop Grumman on price by about 30 percent in Britain's tender for the Watchkeeper system by using an off-the-shelf Hermes UAV from Elbit of Israel.

Use of an off-the-shelf product reduced risk and allowed scarce money to be invested where it was needed - in the mission system, Dassault's Charles Edelstenne said.

Thales and Indra would equally share work of mission payload, Thales' Denis Ranque said.

Indra's Joaquin Uguet said the partnership would deliver «the best system at the least cost.» Spain would use its UAV for civil security missions, including control of illegal immigration and anti-drug-running operations, as well as military applications, he said.

«The highest political authorities are reviewing defense policy,» Edelstenne said, referring to the proposed French white paper on defense and national security. Spain was engaged in a similar exercise, he said.

One of the white paper's priorities is «knowledge and anticipation,» and the UAV is a key component in that domain, Edelstenne said. France and Spain exchanged their requirements and found them very similar, he said.

«This is a new offer derived from customer requirements,» Ranque said.

A launch decision taken early in 2009 would allow a first delivery by the end of 2012.

An initial requirement is for three platforms and systems each for France and Spain, Edelstenne said. Each of the four companies would have 25 to 30 percent of the work. The joint offer from the four companies was a common-sense exercise based on pragmatism, Edelstenne said. Each company has shown its competence in its field, and a selection of their system would avoid reinventing the wheel.

EADS said: «The Advanced UAV is a truly European program and we will offer our customers a tailor-made solution which will be based on leading-edge technologies and the expertise of EADS in France, Germany and Spain.»

The Délégation Générale pour l'Armement received June 3 from prime contractor EADS its first SIDM interim MALE surveillance drone, also known as Eagle One. The system is five years late. Samir said the late delivery was due to EADS' doing development work after IAI had delivered the platform on time. The ensuing delay meant «huge money lost,» he said.

Under a three-nation agreement among France, Germany and Spain signed last year, EADS is working on a risk-reduction study for its modular Advanced UAV. The risk-reduction phase is scheduled to last 18 months. «This study will provide the three nations with all necessary information for the decision to launch the development of the Advanced UAV program,» EADS said.

NATO REVIVES GROUND SURVEILLANCE PROJECT

By Thomas Newdick

Defense News, USA

www.defensenews.com

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Abandoned in June 2007, the resurrected NATO Alliance Ground Surveillance (AGS) system soon could see a request for proposals (RfP) that will spur action on funding, workshare distribution and the establishment of a main operating base for the UAV based system. Pull approval may be granted by year's end.

Northrop Grumman officials at the May 27-June 1 Berlin Air Show said the RfP from NATO could be issued «within days» to begin building the long-sought capability, aiming to have the first systems operational by 2012. Availability of the Global Hawk itself is not an issue in terms of initial capability because of surplus industrial capacity.

Gone is the manned Airbus A321 component that would have carried a ground surveillance radar developed for the purpose through U.S.- European cooperation. Gone as well is AGS Industries, which ran the project. The new project is now centered on provision of eight Block 40 RQ-4B Global Hawk UAVs equipped with U.S.-supplied Multi-Platform Radar Technology Insertion Program sensors. The aircraft will come off the U.S. Air Force production line but will be NATO-owned and operated.

Northrop Grumman envisions only «slight modification» of the UAVs to integrate them with the selected ground segment. This latter will include items such as data links and systems for data processing and target exploitation. With a Northrop as project leader, and with off-the-shelf U.S. sensors touted as a means of meeting budget constraints, to what degree will non-U.S. NATO members be contributing? Northrop officials say they will still have a role to play.

«Our program for building the system would seek to employ to the maximum extent possible - for practical business reasons and policy reasons - those European elements that we can take as essentially non-developmental items,» said Jim Moseman, Northrop Grumman international manager.

Items that could come from European industry include the subsystems required for data transmission and exploitation. Northrop also plans to include a mobile ground station within AGS, and it will be an entirely European product. Northrop also is looking to integrate the AGS Global Hawk with the U.S. Air Force fleet.

With program costs more than halved, is technology being sacrificed to keep within budget? Northrop says that realizing the potential capability remains the aim, although it admits that it is looking for ways to economize. «Not yet having the

RfP, we are not in the position to name a price or name a contract cost,» Moseman said.

The next stage will be the receipt of the RfP, to include the required support infrastructure and command and control components. Thereafter, NATO will have to select a main operating base for the UAVs, as well as approve the funding mechanisms for the program. Northrop must then decide on how it is going to divide workshare across the 19 partner nations.

NETHERLANDS TO GET UAS
Defense News, USA
www.defensenews.com
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AeroVironment (AV) announced the Netherlands' Ministry of Defence, acting through its Defence Materiel Organization, has awarded AV a \$7.7 million contract for RQ-11B (Raven) small unmanned aircraft systems. Each Raven system typically consists of three air-craft, a ground control station, a remote video terminal, spare parts and related services. AV's Raven is a 4.2-pound, back-packable, hand-launched sensor aircraft that provides day-and-night instant video imagery for «over the hill» and «around the corner» reconnaissance, surveillance and target acquisition. The U.S. armed forces use Ravens extensively for missions such as base security, route reconnaissance, mission planning and force protection.

QINETIQ TO PROVIDE ROBOTS
Defense News, USA
www.defensenews.com
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QinetiQ announced that QinetiQ North America's Technology Solutions Group has been awarded a \$400 million indefinite delivery, indefinite quantity contract for Talon robots and replacement parts for the U.S. military in Iraq and Afghanistan. The award was made by the Robotic Systems Joint Program Office, administered by the Naval Air Warfare Training Systems Division. It is a follow-on to the \$150 million contract awarded in spring 2007 that has been fully funded. More than 2,000 Talon ro-bots are deployed around the world, with many in Iraq and Afghanistan. They are used primarily to assist troops with the dangerous job of detecting and disabling improvised explosive devices.

ROBONIC EYES BIGGER SLICE OF EUROPEAN MARKET
By Gerard O'Dwyer
Defense News, USA
www.defensenews.com
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Finland's Robonic is striving to position itself as a center of European UAV activities, including an Arctic test flight center that would avoid the military airspace restrictions found elsewhere on the continent. Headquartered in Tampere, Robonic has a successful 20-year track record in the UAV launcher field, supplying target and tactical UAV systems to a growing global client base. It had concentrated on the production and supply of pneumatic UAVs for military application catapults and was acquired by Sagem Défense Sécurité (Sagem) in June 2007.

For Sagem (part of Safran Group), the takeover added a new dynamic to the French defense group's UAV centered operations, and especially development of new generation Sperwer high-endurance catapulted tactical UAVs.

«Getting Sagem as an owner was a huge development for us in Robonic,» said Juha Moisio, CEO of Robonic. «We were always ambitious, but having Sagem as our parent company has meant that our strategic goal to become a global player, and leading supplier of UAVs worldwide, was within reach. Robonic is established and recognized as a leading UAV player globally. We are on the radar screens.»

Post-acquisition, Robonic has operated as an independent manufacturing and sales company within Sagem. The company also is working closely with Sagem's Sperwer--modernization programs. The Sperwer UAVs are currently in operation with the armed forces of Canada, France, Greece, Sweden and the Netherlands.

«We are a very ambitious company,» Moisio said. «Sagem brings technology, competence and large-scale resources. We expect strong demand and growth in sales over the next two years. We are in a growth-intensive market segment, and a marketplace that is consolidating. We want to play our part in this consolidation globally too.»

One analyst said the acquisition by Sagem was a stroke of luck.

«The costs involved in UAV system development are huge, and it is not a place for small UAV companies,» said a defense analyst at the Oslo-based investment bank Orion. «It was Robonic's good fortune to attract Sagem when it did, because the company simply did not have the capital, nor access to the capital it would require, before Sagem came knocking at its door.»

«There is no evidence that the armed forces of Denmark, Sweden, Finland or Norway will spend big on UAVs. For Robonic to succeed, it will need to use Sagem's global marketing channels and build up a strong client-base. UAVs may be the future, but Robonic needs to show it can stay in the game until UAVs become a must buy rather than an option,» the analyst

said.

Jan Ihrfelt, an industry markets analyst with Swedbank in Stockholm, said although more than 80 percent of Robonic's sales are generated from military orders at present, the company could be achieving 60 percent of its revenues from civilian UAV launcher contracts in five to 10 years.

«As military spending is always hard to estimate from year to year, the military demand side of UAVs is difficult to forecast, and more difficult to predict than probable civil-ian sales. Robonic is clearly intent to exploit both the military and civilian markets for UAVs. I would not be surprised if the company believes there is a future in the civilian market In terms of global sales potential, it certainly helps that Robonic is a Sagem owned UAV launcher company and not simply an independent supplier based in Finland,» Ihrfelt said.

Arctic Ambitions

Robonic's vision, and the level of its ambitions, were evident in the company's Arctic UAV Test Flight Center project and plans to locate a European-scale UAV test center at this Kemijärvi-based facility, which is north of the Arctic Circle in Finnish Lapland. Sagem's long-endurance tactical UAVs were tested in Kemijärvi in 2006.

«The Arctic test center project is ongoing,» Moisio said. «We believe we have a good possibility to bring in customers next year. I am very hopeful it can work and literally take off. It is something we want to make work.»

Robonic is seeking customers for the «Euro» Arctic UAV Test Flight center, says Moisio. «Our ambition is to market the Arctic test center as a European UAV test center. The more and more that military airspace in Europe is reduced, and with fuel prices increasing, defense organizations in Europe will have a greater demand for military airspace,» Moisio said. «This will lead to more of the same organizations asking, where do we fly UAVs?»

Robonic is engaged in a strategic collaboration with the municipality of Kemijärvi to appraise the commercial potential behind establishing a European-scale Arctic UAV Test Flight center at Kemijärvi Airport that would serve the European and worldwide UAV industry.

The airport serves military and civilian aircraft and is situated in one of Europe's most sparsely populated regions, with low airspace jams compared with mainland Europe's congested skies.

«Military airspace may be congested in other parts of Europe, but we can offer an ideal test environment for UAVs,» Moisio said. «It is really a question of finding the right customers. UAV development is a slow process, and it is taking longer for some of the customers we are in talks with to get over certain hurdles.»

The proposed Arctic center's facilities would include support for both catapult- and runway-launched UAVs. Kemijärvi airfield includes a 1,400-meter runway. The present Kemijärvi UAV test center handles basic UAV flight training services, with optional bolt-on expansion to cover all areas and elements of UAV operations, including operator and payload specialist training.

The first Robonic pneumatic UAV catapults were sold to the Finnish Defense Forces in the 1980s and 1990s, and the first Robonic pneumatic launcher for tactical use was delivered to Finland for its Ranger system in 2000. A follow-on delivery of a similar type of launcher was made in 2004. Robonic's customized UAV launchers have been sold to the Finnish and Dutch defense forces and EADS.

The Sagem DS Sperwer-A and Elbit's Hermes 450 have been launched from Robonic's third-generation launchers. Robonic's launchers handle UAVs that weigh from 10 to 1,000 kilograms. Launcher systems produced are used with both propeller and jet engine high-performance target UAVs as well as tactical UAVs. Modular designs cover all the main applications, including trailer- and truck-mounted, semi-mobile and fully stationary concepts.

Robonic secured a contract to deliver a third-generation UAV MC255LLR launcher system to the FDF in April. The dual-role system will support the launch of aerial targets by the Finnish Air Force, in addition to launching the Finnish Army's Meggitt Banshee and the Ruag Ranger tactical UAV systems. The delivery to the Air Force marked the first time a Robonic UAV system has been optimized for dual-role operations to meet differing user needs by armed forces.

«The system has also been designed for rapid deployment and reload. One of the design criteria was that the launcher would fit into a 20-foot sea container and that it is air transportable,» Moisio said. Previously, the MC255LLR was selected for Britain's Combined Aerial Target Service target program. Robonic is in cooperation with Selex Galileo Avionica to develop a catapult launch capability for the Falco program. Cooperation efforts are also under way with EADS 3Sigma of Greece, focusing on the requirements of its target drone family, Moisio said.

«UAVs can go to places where other aircraft cannot, and where it would be very dangerous for humans to operate. There will be strong growth in military sales, and in sales of UAVs to the civilian sector too, in coming years. I can see a bigger upward sales curve in sales to civilian markets,» he said.

SINGAPORE SHIFTS UAV FOCUS BACK HOME

By Andrew Chuter

Defense News, USA

www.defensenews.com

June 9, 2008

Most of Singapore's unmanned vehicles were made in Israel, but the general attitude at the Defense Technology Asia (DTA) show is that its next purchases will likely be made at home.



Singapore Technologies Engineering Group, a private company, is developing autonomous UAVs, including the fixed-wing Skyblade III and IV and the FanTail 5000, a 6.5-kilogram UAV that takes off and lands vertically, company spokeswoman Audrey Tan said.

The FanTail 5000 can be pulled from a backpack and launched in 30 minutes. It can fly up to 90 knots on missions out to 8 kilometers and hover in strong winds up to 30 minutes, she said.

The 5-kilogram Skyblade III can be deployed within 30 minutes with a preplanned route that can be altered in flights of up to one hour and up to 1,500 feet. It can operate day or night, fly at 70 knots and operate up to 8 kilometers away.

The 50-kilogram Skyblade IV has a modular design that allows for more payload options, including ones to handle reconnaissance, battlefield surveillance, search and rescue, artillery fire support, target tracking, and maritime and coastal patrol. Slated for flight early next year, it is launched by catapult and lands under a parachute, Tan said. It can fly as far as 100 kilometers, up to 15,000 feet high, at speeds up to 80 knots for up to 12 hours. The Skyblade IV has been compared to the EMIT Aviation Sparrow UAV.

ST Aerospace, part of ST Engineering Group, is working on a MAV 1 low-observable tactical UAV, part of a new Smart Warfighting ARray of configurable Modules (SWARM) research program, also run by ST Aerospace. Few details have emerged about it.

Singapore is one of the few countries in Asia with its own UAV command under the Air Force.

In May 2007, the Singapore Air Force opened its UAV command at Murai Camp as part of a restructuring meant to help create a «3rd-generation force.»

The command's 116 Squadron operates an unknown number of Israeli Elbit Hermes 450LEN the 128 Squadron operates 40 Israel Aircraft Industries Searchers, procured in 1998 to replace 14-year-old-IAI Scout remotely piloted vehicles.

Navy's Unmanned Plans

In May, Rear Adm. Chew Men Leong said the Singapore Navy was looking at unmanned underwater vehicles (UUV) and un-manned surface vehicles (USV).

The Singapore Navy has two Hy-droid Remus 100 autonomous UUVs, which can dive to 120 meters for 22-hour

hydrographic measurement operations in the waters around Singapore. Sources at the DTA show, May 22-23, have said the Navy is looking at the Remus 600, which can dive to 1,500 to 3,000 meters for missions of up to 70 hours. The Navy also operates the Israeli-built Rafael Protector USV, a 30-foot rigid-hull inflatable boat that can handle force protection, anti-terrorism, surveillance and reconnaissance missions at 40 knots with a Mini Typhoon Stabilized Gun. The Navy used the Predator off Iraq for force protection during peacekeeping missions in 2005. Since 2002, the Singapore Navy has worked with the U.S. Navy on the development of the Spartan Scout USV - a 7-to 11-meter rigid-hull inflatable boat that can operate by remote control as a modular, reconfigurable, high-speed, semi-autonomous craft - for mine countermeasures, anti-surface warfare, surveillance and reconnaissance, and anti-submarine missions.

**TOO DEMANDING?
Tough Requirements Push Firms Away From Canadian program**

By David Pugliese

Defense News, USA

www.defensenews.com

June 9, 2008

Two major firms have backed away from a Canadian program to lease UAVs for Afghanistan, citing concerns that too much risk was being put on the winning contractor. It's the second time that Canada has attempted to lease UAVs for its Afghanistan mission. The first, in the fall of 2005, had to be scuttled after industry told the Department of National Defence that its requirements were too broad for the amount of money it was willing to spend.

The latest effort would see a lease contract in place by July 4 with the system in Kandahar by February. An industry contractor would provide not only the UAVs but also the per-sonnel in Afghanistan to launch, recover and maintain the aircraft. The lease program, dubbed Noctua [Latin for «little owl»] would replace the Canadian Forces' existing Sperwer UAVs operating in Afghanistan. The Sperwers do not have the endurance or range for Afghan operations, according to Canadian military officers. Industry officials estimate the Noctua project will be worth about 190 million Canadian dollars (\$186 million).

But General Atomics Aeronautical Systems, whose Predator B UAV is viewed positively among Canadian Air Force officers and was seen as a front-runner to win the lease, declined to bid. The San Diego company issued a statement saying it will focus its efforts on a Canadian military project, the Joint UAV Surveillance Target Acquisition System (JUSFAS), which is designed to purchase outright a UAV system.

«We are focusing our efforts on the long-term JUSTAS program and intend to promote the multi-mission Predator B,» Thomas Cassidy, president, Aircraft Systems, General Atomics, said in an e-mail «The purchase of Predator B offers the best value solution and ensures that Canada's ISR needs are met today and far into the future.» Cassidy did not provide details on why the firm decided against bidding on Noctua.

But in an earlier interview, John Porter, General Atomics' deputy director of business development for the aircraft systems group, said Noctua's requirements were fairly onerous and placed heavy penalties on the contractor. «If I'm a month early with delivery, I get \$60,000, but if I'm a month late, I owe them \$5 million,» Porter explained.

In addition, on May 16, Thales informed the Canadian Defence Department that it was no longer interested in bidding on Noctua. Thales was to have been the prime contractor for a joint proposal from Thales Canada and Thales UK, Elbit and L-3 Communications.

Industry sources said Thales also made its decision because of concerns over risk. For instance, the contractor faces significant financial penalties if the full UAV capability is not delivered. But the definition for the full UAV capability included hundreds of elements, some of a minor nature, that had nothing to do with actual UAV operations and capability, and for which the contractor could be penalized, according to industry sources.

One industry executive noted that in a war zone such as Afghanistan, unforeseen issues always arise, and flexibility becomes vital. But in the Noctua project, financial penalties for contractors, and not a system to work out issues between the military and industry, dominated the proposed agreement, some industry officials said.

L-3 Communications MAS of Mirabel, Quebec, and Elbit Systems of Israel continued without Thales and have proposed to offer Canada the Hermes 450 built by Elbit would serve as prime contractor and 1,3 as the lead subcontractor.

Stephen «Fig» Newton, L-3 Communications MAS' director of business development, said that while the Noctua project focuses risk on the prime contractor, it is still an acceptable business opportunity. «It has to be properly managed, but it's certainly not something that stops us from participating,» Newton said.

Officials with MacDonald Dettwiler and Associates (MDA), Richmond, British Columbia, also agree and put in their bid on Noctua after joining forces with Israel Aerospace Industries. They are offering the Israeli Heron. MDA is taking on the role of prime contractor.

David Hargreaves, MDA's vice president information systems group, said the performance-based nature of the Noctua project places great emphasis on the contractor's ability to deliver the capability. «We spent an awful lot of effort analyzing [the potential risk], and we believe it's under control so hence we bid,» he said. «At the core is the reliability of the Heron.» Officials with Public Works and Government Services Canada, which is helping oversee the project, said bids are being evaluated. They declined to comment on in-dustry concerns about Noctua's risk.

The Canadian government has been under pressure to provide new UAVs for the Kandahar mission. In January, a blue-ribbon panel looking into the country's Afghanistan mission cited the acquisition of UAVs as one of the criteria needed

if Canada was to remain committed to the war. Canadian Defence Minister Peter MacKay also said the UAV lease is one of the key ways to reduce the number of Canadian casualties in Afghanistan. The aircraft will be used to seek out insurgents planting improvised explosive devices as well as provide surveillance of convoy routes and other intelligence. The Canadian project does not stipulate that the winning firm provide a certain number of UAVs. Instead, it requires enough aircraft to provide a particular capability over a certain period of time. It also requires the aircraft to be capable of being 12 hours on station as well as gather and transmit high-quality imagery 100 kilometers from Kandahar. The UAVs will not be armed. The Air Force would provide instrument-rated pilots to operate the UAVs in Kandahar.

TURKISH MILITARY UAV AMBITIONS FACE DELAYS

By Burak Ege Bekdil and Umit Enginsoy

Defense News, USA

www.defensenews.com

June 9, 2008

Turkey's war with a separatist Kurdish group on both sides of its southeastern border with Iraq makes clear the need for advanced UAVs, officials say, but various off-the-shelf and indigenous development programs have left the military scrambling for solutions.

For example, the delivery of 10 Heron UAVs ordered under a \$190 million contract in 2005 from Israel's IUP, a partnership between Israel Aerospace Industries and Elbit, is delayed, Turkish procurement and military officials said. Under IUP's winning proposal, Herons originally were to start arriving for Air Force use by early 2007. The deliveries were rescheduled for October 2007, and then for spring 2008. At the end of last year, Israeli officials said the vehicles would be delivered soon, but the devices still are several months away, according to Turkish procurement officials.

As a stopgap solution, Turkey last July leased a Heron system for 12 months mainly to combat increased attacks by the Kurdistan Workers Party (PKK) in the south-east. Turkey, the United States and the European Union view the PKK as a terrorist entity. The lease costs \$10 million, according to defense procurement officials, and the lease period likely will be extended. The leased Heron, along with two I-GNAT UAVs purchased from U.S. firm General Atomics in the 1990s and still in serviceable condition, constituted Turkey's sole UAV assets in the fight against the PKK until three Israeli-made Aerostars were acquired in March. Out of eight I-GNAT and GNAT 750s acquired from the U.S. company in the 1990s and used extensively against the PKK, two have remained operational.

But the Aerostars, purchased from Israel's Aeronautics Defense Systems for about \$15 million, according to industry sources, have shorter range, less endurance and fly at lower altitudes than do the Herons. These aircraft are now in service.

When Turkey in 2005 selected Israel's Heron over General Atomics' Predator, officials from the U.S. company accused Turkey's procurement agency, the Undersecretariat for Defense Industries, of coming up with specifications that were in conflict with U.S. export laws and regulations.

For the longer term, Turkey is set to develop an indigenous model in the medium-altitude, long-endurance category, but this too faces delays and probably is a few years away from meeting the military's requirements. Under a December 2004 contract signed between Turkey's aerospace powerhouse Tusas Aerospace Industries and the defense procurement agency, the first prototype of that UAV, dubbed TIHA-A, was to take to the skies this spring. But industry sources said the most optimistic estimates now put this date off until mid-2009, which means the first operational TIHA A unit may not be ready before 2011.

The TIHA-A is a Heron-type aircraft with a payload being developed by Turkish military electronics company Aselsan. It uses a synthetic aperture radar and a body and engine that resemble the Predator.

The only other credible intelligence/reconnaissance assets that have joined the Turkish military recently are the Bayraktar, small UAVs manufactured by the local consortium KaleBaykar. Officials said first acceptance tests of the hand-launched UAV systems have been successful and the prototype aircraft, with over-the-hill capabilities, was delivered last December. The UAV program entails local production of 19 systems, each containing four aircraft.

But analysts said the hand-launched UAVs are very short-endurance systems designed as «infantryman's eyes over the next hill,» thus a far cry from the Turkish military's pressing need for strategic and tactical reconnaissance assets.

Separately, procurement authorities are negotiating with a consortium of local companies Vestel and Baykar for the design and development of tactical UAVs. One industry official said the negotiations will probably last until the end of the year and be followed by a deal for a prototype model.

U.K.'S WATCHKEEPER UAV COULD GET LARGER ROLE

By Andrew Chuter

Defense News, USA

www.defensenews.com

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Britain's Watchkeeper tactical unmanned air vehicle system, on track for fielding by late 2010, could also provide the ground segment for a wider, network-enabled military capability. In written evidence provided last week to Parliament's Defence Committee, officials from Watch keeper makers Thales UK said, «The Watchkeeper system could provide

a basis for the U.K. based network enabled ground infrastructure exploitation and dissemination capability as one of the key components to integrate the layered manned and unmanned ISTAR collector systems across different layers of command.» The Ministry of Defence here acknowledges it currently has a short-fall in its ability to disseminate and exploit ISTAR information.

Thales business development vice president, Victor Chavez, told the committee there was nothing to stop Watchkeeper's ground information infrastructure being extended to take data from other UAVs and sensors beyond those to be carried by the Elbit Systems-designed WK450 platform. Chavez said the Watchkeeper ground segment also could provide elements of Britain's upcoming Dabinett program, which in part is aimed at knitting together the strands of ISTAR information from manned and unmanned platforms.

The committee is investigating the role of UAVs as part of Britain's wider requirements for intelligence, surveillance, target acquisition and reconnaissance. Thales, Northrop Grumman, the Ministry of Defence, 1,3 and others have given the committee written or oral evidence. .

Prime contractor Thales UK told the committee it had met program milestones, including a first flight for the Elbit-designed platform, a much modified Israeli Hermes 450 UAV, in mid-April. Now, says Nick Miller, the UAV system business director at Thales, the plan is to continue «progressive trials throughout 2008 of avionics and payload integration systems, moving to the U.K. in late 2008 or early 2009 for UK trials at Parc Aberpoth [Britain's UAV center of excellence]. Watchkeeper is on schedule for its in-service date of 2010-11,» he said.

The Israeli work is expected to include testing and integration of the automatic take-off and landing system and the Thales-developed I-Master radar and electro-optical-Infrared and laser target designator payloads.

Thales was named preferred contractor for a 700 million pound (\$1.4 billion) deal to build Britain's Watch keeper in 2004. When fully fielded by the Army's Royal Artillery Regiment, some 54 air vehicles will have been delivered alongside a ground segment able to disseminate and exploit the information up and down the command chain.

Overall costs of Watchkeeper are budgeted at 901 million pounds. The 201 million pound difference compared with the value of the Thales deal is accounted for by government-furnished equipment and a number of unspecified contracts placed outside of the Thales deal, said a spokeswoman for the Defence Equipment & Support arm of the MoD.

The WK450 vehicles are being built by a Thales-Elbit Systems joint venture in Leicester called U-TacS. A new engine for the vehicle is also being supplied from the United Kingdom and intellectual property rights for the Watchkeeper system reside in Britain, the company said.

Other than procurement of stop-gap capabilities to meet urgent operational requirements in Afghanistan and Iraq, Watchkeeper will be Britain's first major UAV purchase since they contracted for the ill-fated Phoenix program in 1985. Unable to perform adequately in the harsh environments of Afghanistan and Iraq and with dwindling numbers of vehicles available, the British Army retired Phoenix earlier this year.

The British had anticipated just such an eventuality. Originally, the Watchkeeper program required the winning contractor to provide an early initial capability during 2007. That requirement was abandoned by the MoD. As it turned out, the British got their early capability anyway as an urgent operational requirement paid for by the Treasury rather than the MoD.

To bridge the gap at the tactical level until Watchkeeper enters service, the British rushed through urgent operational requirements to provide UAV based ISTAR capability to support operations in Afghanistan and Iraq. That included striking a deal with Thales and Elbit for an ISTAR-by-the-hour arrangement using the Israeli company's standard Hermes 450 vehicle in both operational theaters. Since entering service a year ago as part of a service provision deal the UAVs, five deployed in each theater, have now passed 9,000 operational hours.

Company executives told the Defence Committee that provision of the Hermes 450 service has been a great practice run for the introduction of the Watchkeeper, particularly on the logistics front. The Thales-led contracting team handles maintenance, flight preparations and take off and landing of the vehicles. The Hermes 450 is handed over to the military for actual operations.

The service provision deal expires mid-2009 and will have to be extended unless the WK450 enters service much earlier, which seems unlikely. Miller said the MoD and Thales are always considering additional and earlier capability. «The successful provision of Hermes 450 into operation had indicated a potential to change early capability into Watchkeeper,» he said. Outside of the Hermes 450 deployment, the Royal Air Force has also acquired a handful of Reaper strategic UAVs for use in Afghanistan.

UAVS TO FILL INDIA'S AWACS NEEDS

By Vivek Raghuvanshi

Defense News, USA

www.defensenews.com

June 9, 2008

Until India finishes developing its planned AWACS aircraft, the military will depend on other surveillance systems, especially UAVs. The Defence Ministry has cleared the purchase of more than 300 UAVs of various types, including fixed-wing, rotary-wing, and micro UAVs for combat and urban counter-terrorism.

The Army is looking to furnish its combat units with high-altitude, long-endurance UAVs, which will fly with manned aircraft and other UAVs. It is also looking to buy about 200 micro UAVs in the next three to five years for reconnaissance

and surveillance over cities, rural areas and mountains day and night. The first micro UAVs could enter service in early 2010. Candidates include Israeli Elbit Systems' hand-launched Skylark and BAE Systems' autonomous Herti, which can fly for more than 24 hours at an altitude of up to 20,000 feet, an Indian Air Force official said. The Navy plans to buy about 12 rotary-wing UAVs; the purchase of an undisclosed number of armed UAVs has also been cleared by the ministry, ministry sources said.

India's defense research agency, the Defence Research and Development Organisation (DRDO), is planning to develop medium-altitude, long-endurance and micro UAVs at home. The DRDO has asked several companies, including the Tata Group, L&T and Godrej & Boyce, about manufacturing the medium-altitude UAV.

India owns about 150 UAVs, including the Israeli Searchers-I and II and Herons, which are being up-graded to Heron Is by Israel Aerospace Industries. The Searchers are to be upgraded to Mk IIIs with longer ranges and endurance.

PRESS RELEASE

1st Fully Autonomous Flight for AVE Drone Dassault Aviation, France July 7, 2008

The Dassault Aviation AVE-D drone completed its first fully autonomous demonstration flight on June 30, 2008 near Toul, France. The flight, watched by representatives of France's Délégation Générale pour l'Armement (DGA) armaments procurement agency, comprised a completely automated sequence: roll from parking spot, runway alignment, takeoff, in-flight maneuvers, landing, braking and rolling back to the parking apron.

This AVE-D flight marks a significant first for Dassault Aviation, confirming the company's expertise in Uninhabited Air Vehicles, or drones. The demonstration flight is a key development milestone for a technology essential to the successful pursuit of the European nEUROn Unmanned Combat Air Vehicle Demonstrator program.

The AVE (Aéronefs de Validation Expérimentale) series is a family of scale model experimental unmanned aircraft developed by Dassault Aviation. These aircraft enable Dassault Aviation to carry out flight validation tests of technological advances in the field of Uninhabited Air Vehicles, or UAVs, including stealth and autonomous flight.

Achieving maximum stealth is a decisive factor for the success of observation or attack missions in a hostile combat environment. The first AVE aircraft-called AVE-D, for «discretion»-made its maiden flight in July 2000, becoming the first stealth drone to fly in Europe.

PRESS RELEASE

Elbit to Supply UAV Systems to a European Country Elbit Systems Ltd., Haifa, Israel July 7, 2008

Elbit Systems Ltd. announced today that it was awarded a contract valued at approximately \$20 million to supply Hermes^(r) 450 UAV Systems to a European country. The systems include both air vehicles as well as complementing ground systems, to be delivered during 2009.

Hermes 450 is a unique Elbit Systems development, which has been the major player in Israel's security activities, and the IDF's primary UAV system. In addition, the Hermes 450 is the basis for the UK Armed Forces' Watchkeeper program, the largest UAV program in Europe. Hermes 450 UAVs are used extensively in armies worldwide, including active war zones such as Iraq and Afghanistan. So far, the Hermes 450 has accumulated over 100,000 operational flight hours.

Haim Kellerman, General Manager of Elbit Systems UAS Division said: «The new order is yet another link in the chain of successes in the marketing of the Hermes 450, building on the level of maturity the system has achieved. The Hermes 450 has well proved its capabilities and reliability over many years of operational performance.» He added, «In light of the current high demand for the Hermes 450, and specifically the requirement for speedy delivery for operational needs, Elbit Systems' UAV Division is prepared to meet the full range of customers' demands.»

PRESS RELEASE

2nd GCS Shelter Delivered to BAE for Herti UAV Programme Marshall SV Cambridge, UK July 8, 2008

A second specialist ground control station (GCS) has been delivered to BAE Systems Integrated System Technologies (Insyte) for the HERTI (High Endurance Rapid Technology Insertion) Unmanned Air System (UAS) Programme by Marshall SV, the Cambridge based specialist vehicle and shelter manufacturer.

Marshall Specialist Vehicles (MSV) delivered the 14 foot shelter on time, to cost and specification in order to meet the timetable for rapid fielding of the system. The selection of the shelter was dictated by the transport modes, including C-

130 «short versions» which will be used to move the GCS and UAS from location to location.

To achieve the programme delivery time and costs MSV dedicated a team of specialist engineers to the programme who were, in partnership with BAE Systems, responsible for planning, design, development, procurement, manufacture and delivery. This enabled the final product to be based on the latest 14' shelter whilst still meeting the performance and operational capabilities required.

MSV were responsible for the manufacture of the shelter and assisted in the build and assembly of the mechanical elements of the internal fit. The electronic and electrical elements of the shelter were designed by BAE Systems and fitted by BAE Systems at the Marshall's site in Cambridge.

Commenting on the programme Peter Callaghan Chief Executive of MSV said «We are really pleased to have helped BAE Systems with this programme. It represented a really challenging programme with difficult delivery targets which were achieved by good programme management and team working in MSV and close work as partners with BAE Systems.»

DRAC DELIVERIES
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
July 14, 2008

The French army received the first batch of 25 DRAC hand-launched unmanned aircraft on June 30. French armaments agency DGA has ordered 35 more of the EADS systems-each containing two air vehicles.

PRESS RELEASE

Honeywell & Thales Sign Teaming Agreement For Unmanned Micro Air Vehicle Marketing
Micro Air Vehicle Provides Accurate Hover & Stare Capability For Military Surveillance on Battlefield and in Urban Environments
Farnborough Air Show, UK
July 14, 2008

Honeywell and Thales announced today that they are teaming together to market the Honeywell unmanned Micro Air Vehicle to military organizations in France, Germany and the United Kingdom. The agreement covers payload and system integration that will be tailored for military customers. The unmanned Micro Air Vehicle enhances soldier safety on the battlefield and in urban combat settings by providing highly accurate situation awareness, threat detection, alerts and over-the-horizon images in hostile environments. The small size and weight of the Micro Air Vehicle allows rapid deployment and recovery for mobile military soldiers. Thales will offer the Micro Air Vehicle as a stand-alone unmanned aerial vehicle (UAV) or as part of larger military programs, such as the Future Rapid Effect System, Future Infantry Soldier Technology and Scorpion, France's military program encompassing tanks, armored personnel carriers, helicopters and battlefield management systems. "Honeywell's Micro Air Vehicle has demonstrated versatility in the field and the value of the real-time surveillance data it provides," said Mike Cuff, Vice President, Helicopters & Surface Systems. "Now we are teaming with Thales to bring this combat-proven experience to the end-users, to help meet their requirements and customization needs. This includes military organizations in France, German and the U.K. that require a valuable surveillance asset."

"We are very happy to team with Honeywell on such a project," said Millar Crawford, Vice President Land Systems, Thales Land & Joint. "Protection of forces – soldiers, vehicles, military camps – is a key concern for most armies. Thales is very involved in this domain and proposes various solutions depending on the situation. The use of such a micro UAV will bring interesting new capabilities. Our approach is to provide solutions that help our customers maximize their operational capabilities and increase survivability on the field." The Micro Air Vehicle is small enough to carry in a backpack and is equipped with video cameras that relay information back to foot soldiers using a portable handheld terminal. The circular vehicle, just 16 (7.25 kilogrammes) pounds and 13 inches (33.02 centimeters) in diameter, operates like a small remote-controlled helicopter and can easily fly down to inspect hazardous areas for threats without exposing soldiers to enemy fire. "The Micro Air Vehicle provides the unique ability to take off and land vertically in all weather, including desert and urban terrains without runways or helipads," Cuff said. The air vehicle offers 50 minutes of flight endurance and more than 40 knots of airspeed, and operates at altitudes of more than 10,000 feet. Precise controls allow it to operate in all weather conditions at high altitudes or just inches from the ground, providing hover and stare capabilities to identify improvised explosive device (IED) detection and other critical missions in war zones. The Micro Air Vehicle requires minimal operator training and the military configuration includes two airborne vehicles, a ground data terminal and operator control unit to guide the aircraft and receive images from the cameras. The operator control unit can be used to program a flight path or control the air vehicle manually. The Micro Air Vehicle features a gimbaled payload with electro-optical cameras for daylight operations or infrared cameras for night missions. Honeywell's Micro Air Vehicle has been field-tested in Iraq and has flown more than 3,500 test flights over the past three years. In 2007 it was demonstrated during flight tests in France and the United Kingdom. The Micro Air Vehicle is available to military, civilian law enforcement and security organizations. The Miami-Dade County, Fla., police department is currently reviewing its use for surveillance in urban environments.

Honeywell has two contracts from the U.S. Navy totaling \$7.5 million for the manufacture of more than a dozen Micro Air Vehicle systems. In 2003, the Defense Advanced Research Projects Agency (DARPA) awarded Honeywell a \$40 million technology demonstration contract to develop the system. A subsequent \$61 million contract was awarded last summer as part of the Army's Future Combat Systems program.

NEW AGE ANTI-COLLISION
UAS in civil airspace: problem or opportunity?
By David Hughes
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
July 14, 2008

Eurocontrol, the FAA and industry standards-setting groups, along with unmanned airframe builders and their avionics suppliers, are grappling with the question of what will be needed for unmanned aircraft to avoid collisions with other aircraft in civil airspace. So far, no one has come up with a comprehensive solution.

One of the key questions is whether the civil and military aviation community and regulators will treat the drive for unmanned aircraft systems (UAS) to gain access to civil airspace as a niche problem for the unmanned community to solve on its own. Or, on the other hand, will the manned community realize that after the UAS community comes up with proven new technology, that an innovative system is likely to do a better job than human eyesight or the existing (but imperfect) traffic-alert and collision avoidance system (TCAS)? By then, the manned community may realize it wants to have the new technology mounted on commercial and business aircraft to improve safety.

In other words, is «sense and avoid» a niche problem (albeit a big one) for the unmanned community, or a big opportunity for both communities to make civil airspace much safer in the future? After all, the Single European Sky ATM Research (Sesar) program and the Next-Gen ATC modernization effort both call for greatly improved air traffic safety so that Europe and the U.S. can handle 2 to 3 times more air traffic by 2020-25. It isn't clear how this will be accomplished.

So far, the manned and unmanned communities aren't talking very much to one another, and regulators are telling the UAS community to let them know as soon as they can comply with the regulations designed for manned aircraft. It's not that they don't want to help, but the regulators' first responsibility is to make sure safety is not compromised while UAS operators take their initial steps to access civil airspace. As is the case in many arenas of civil aviation, the differences among the parties involved seem capable of slowing progress to a halt.

Both the FAA and Eurocontrol have specialists focused on the question of providing better access to civil airspace for both civil and military UASs. Currently, two standards-setting bodies are working on the issue - RTCA Special Committee 203 and the European Organization for Civil Aviation Equipment (EUROCAE) Working Group 73.

«From the FAA perspective, when the standards are established (for better UAS access to civil airspace) any applicant can come in and bring a system that shows compliance with the standard,» says Doug Davis, the manager of the FAA's Unmanned Aircraft Program Office. Until those new standards are developed, UAS operators could apply for a type certificate under Part 21 as long as they can comply with existing federal aviation regulations. But even with a UAS standard, the problem of sense and avoid could be solved by different UAS operators «in a myriad of ways» for different applications, he says.

Of course there was more of a comprehensive solution to help manned aircraft avoid collisions in the late-1980s after a serious accident. Following the midair collision between a DC-9 and a Piper Archer over Cerritos, Calif. (Aug. 31, 1986), the Traffic Alert and Collision Avoidance System was mandated by the FAA. MIT Lincoln Laboratory and Mitre Corp. developed the technology over a decade at a cost of \$400 million. But a global solution such as TCAS for the UAS sense-and-avoid problem isn't on the horizon in the U.S. or Europe.

Davis says opinions are divided as to whether all of the technology needed to develop a sense-and-avoid system already exists. «It is a split camp,» he admits. Sensors that could play a role include optical, electro-optical, infrared and phased array radar. But it may be 10 years before the minimum aviation system performance standards (MASPS) are developed for a sense-and-avoid collision avoidance system, he says.

Davis also confirms that the FAA has been working closely with the Defense Dept. on some sensor research. In fact, the U.S. Air Force Research Laboratory and Northrop Grumman are preparing for a second week of flight tests in November with a Calspan Learjet to evaluate sensors and collision-avoidance algorithms. As with the first week of flight testing with the same Learjet 25B in April, these tests will probably include an FAA Beechcraft King Air and a Convair 580 in the roles of intruder aircraft flying on collision courses. The Learjet will be configured to emulate a Global Hawk.

AFRL will evaluate two sensors and two systems: an electro-optical camera, a mechanically-scanned X-band radar, Automatic Dependent Surveillance Broadcast (ADS-B) and TCAS. The emphasis will be on how electro-optics and radar can detect non-cooperative aircraft. Vincent Raska, the sense-and-avoid program manager for AFRL's air vehicle directorate, says electro-optics provide good azimuth and elevation data on the target but no range data just the opposite of radar. Combining output from the two sensors will provide very accurate data on any aircraft nearby.

Davis notes that any escape maneuver that works autonomously has to avoid risking harm to aircraft it is not trying to avoid. Some modeling and simulation is being done to explore this issue, but there is still a lot of work to be done in that area, he adds.

Even with no pilot on board, Davis says the expectation is that an automated system «needs to do better than the

human eyeball» in seeing and avoiding other aircraft. He agrees with the idea that technological advances in solving the sense-and-avoid problem for UASs could make the national airspace system dramatically safer than it is today.

But while the FAA works on the longer-term solutions, it is also talking to the makers of UASs who are interested in gaining more near-term access to civil airspace. One such discussion is with Insitu Inc., maker of the ScanEagle UAS, about the possibility of testing a ground-based radar at the FAA's William J. Hughes Technical Center that could monitor the flight of the 40-lb. ScanEagle within a line-of-sight distance (about 15 mi.). Since the radars - made by DeTect Inc. of Panama City Fla. - are intended for marine use and to spot birds near airfields, the FAA doesn't know much yet about their capability to show the radar operator what the intent of nearby aircraft might be.

Davis says talks about the testing have been informal so far; the next step would be to develop a test plan about how to gather data. In an unrelated project, the FAA plans to explore whether a radar that can detect incoming mortar rounds could be used to monitor small UAVs and other aircraft flying near a ground-based operator.

In Europe, Holger Matthiesen of Eurocontrol agrees that there are limitations to the see-and-avoid procedures now in use that rely on eyesight. «We may be able to do better,» says Matthiesen, a senior specialist in air traffic management (ATM) working on UAS issues. Matthiesen says that developing an «all seeing (avionics) box» to replace «see and avoid» with the human eyeball may be very expensive. If the cost is only divided among all future UAS users who want to access civil airspace, it may be prohibitive. But if costs can be shared by unmanned and manned aircraft operators, the project could be funded and improve air safety in «quantum leaps,» as envisioned by Sesar. So far, he doesn't believe the manned aircraft community is aware of the potential for what a future sense-and-avoid avionics box might do for them. A key question for the long-term development of sense-and-avoid systems is how they will be integrated with the current TCAS system, Matthiesen says. He notes that TCAS requires a pilot to respond to a Resolution Advisory (RA) warning in two seconds, but warns that UAS operators on the ground will be challenged to react that quickly due to the delay in communicating an RA to the ground. If a sense-and-avoid system is developed for UASs independently, the system can't be allowed to order maneuvers contrary to what TCAS expects an aircraft to do. These are the sorts of issues that need to be addressed.

Eurocontrol is focusing on the sense-and-avoid issue in two time frames. In the short term (through 2015), limited steps will allow UASs to access civil airspace (so called non-segregated airspace in Europe where both civil and military aircraft can operate). This includes letting small UASs operate within line-of-sight of controllers on the ground. Matthiesen says police and security forces would be the first to make use of this type of permission. In the long term (2020 and beyond), the Sesar program envisions a more robust solution for sense and avoid for UASs. There is no development funding earmarked for this research in Sesar as of now and the work would probably have to be funded by industry, he says.

One thing Eurocontrol doesn't envision is changing the rules of the air. New avionics won't cancel the old see-and-avoid regime used by manned aircraft. Balloons and gliders will have priority, for example, something a sense-and-avoid system on a UAS would have to deal with.

If the avionics industry ends up in the driver's seat in trying to solve the sense-and-avoid problem for unmanned aircraft, a key player is likely to be Rockwell Collins, which recently acquired Athena Technologies Inc. of Warrenton, Va. Athena, founded by MIT trained David Vos in 1998, has done pioneering work on flight control technology for UASs.

For example, the Micro Guidestar system puts multiple capabilities in a 4-oz. package, including GPS (with Wide Area Augmentation System capability), a 3-axis inertial navigation system, a full air data system, 3 accelerometers, 3 rate gyros, a 3-axis magnetic sensor, and computers for flight control and autopilot functions. The GPS and INS combination provides accuracy to within 3 meters. The high-reliability system has a mean time between failure of 83,000 hr. and costs \$5,000-10,000 depending on the configuration. This type of technology can guide a UAS on a completely automated flight and return it to hit a target measuring 1 X 1-ft., using a wing-snag sky hook for recovery.

When you ask Vos, someone who has built highly reliable, miniature technology to automate UAS operations, he says yes, the technology is available to build a sense-and-avoid system for UASs. He adds the list of candidate sensors includes TCAS, radar, lidar, electro-optics, infrared, ADS-B and «various other incarnations» of these systems. The real solution will be «the right mix of technology to do air traffic management,» he says.

What Vos is talking about is to have all aircraft plan to fly a trajectory without colliding with other aircraft. He says the «collision avoidance» piece of the puzzle is a reactive one. But planning a trajectory that does not conflict with other traffic is something the military does all the time. The military can plan and implement a trajectory for any aircraft and miss all others operating along the way to the objective. This existing capability is very close to achieving Vos's idea of future ATM in which UASs can fly safely in civil airspace.

Vos believes that air traffic should be able to manage itself with an auto-mated control system of the type UASs use now, and that such a system will be better than see and avoid. In fact, he singles out one airport where UASs have been flying in the same airspace with manned commercial and military aircraft for years. That is Balad AB in Iraq. There are important lessons to be learned from the many hours of experience accumulated there, Vos notes.

UNMANNED, UNSEEN**Technologies to spawn operational European UCAVs head to assembly stage****By Douglas Barrie and Robert Wall****Aviation Week & Space Technology, USA**www.aviationweek.com/awst**July 14, 2008**

Britain's Taranis unmanned combat air vehicle demonstrator will fly in 2010, with the French-led Neuron to follow in 2011. Both will use the same model of Rolls-Royce Adour engine - though ironically, propulsion is one area that is underfunded by both nations in terms of future development.

Europe will conceivably be in a position to begin fielding operational UCAVs toward the end of the next decade, but both programs already build on years of predominantly classified research and development.

The U.K. and France have been instrumental in pushing UCAV technology development in Europe; in Britain, through the BAE Systems-led Taranis project, while France has taken the lead on the multi-country Neuron UCAV demonstrator. Even with defense budget pressures in both countries, industry officials are confident their efforts will proceed.

In the U.K. a UCAV is a candidate to meet at least part of the air force's Deep and Persistent Offensive Capability (DPOC), which is now assumed by the Defense Ministry to be entering service in 2018. For the Royal Air Force a UCAV would provide a first-day-of-war deep-strike capability against enemy air defense systems and time-sensitive targets using a platform capable of surviving in airspace defended by double-digit surface-to-air missile systems in the class of the Russian Almaz Antey S-400. A 24-hr. endurance capability is believed to be under study.

Taranis will take the U.K. a considerable way toward an operationally capable system. The effort is aimed at risk reduction in several areas, including signature control and flight performance. Beyond Taranis the ministry is looking at an as-yet-undefined assessment phase. Taranis is being run by the Defense Ministry's Strategic UAV Experiment (Suave) team. Industry partners alongside BAE Systems are Rolls-Royce, Qinetiq and GE Aerospace.

The program, publicly launched in 2006, builds on classified low-observable and UCAV design work that started more than a decade ago. Taranis, says BAE Systems Suave project director Chris Allam, draws in part from the experience of the Testbed/Replica manned aircraft low-observable (LO) demonstrator program from the late 1990s in terms of airframe and systems integration. In terms of LO technology, Allam suggests that the «reasonable gap between the two mean things have moved on a bit»

Another LO-related effort was the 4-5-year Nightjar program carried out by the Defense Ministry in conjunction with industry using BAE's radar cross-section range at Warton. This is thought to have looked at specific elements of airframe design and performance related to LO signature. The Raven sub-scale demo program, first flown by BAE Systems in December 2003, provided valuable input in terms of development of control laws for an unstable tailless airframe.

The Taranis design was the culmination of several studies by the ministry and industry, a process that is continuing in support of developing an operational platform. «The Taranis build program is going well, we're effectively in mid-build, while avionics rigs are also up and running. We'll start final assembly [at Warton] toward year-end.» Taranis will undergo flight testing in 2010 with aims including examining the «operational utility» of aspects of the design, says Allam. Several research efforts are underway regarding autonomous operation of unmanned platforms in the DPOC role, including Qinetiq's Surrogate program, which has used a BAC 1-11 test aircraft to act as a UCAV. One aim of the Taranis trials is to demonstrate the required level of autonomy, including a representative strike mission. Sensor and payload integration are also being addressed.

The Initial Gate approval - part of the ministry's procurement process - is due in 2011. Allam suggests the industry and the ministry are looking at how to proceed with the program in the assessment phase. A «spiral development-type approach» is one option.

The Taranis design utilizes comparatively mature LO technology, thought to be base-lined against the present generation of threat systems. In moving forward with the full development and acquisition-or off-the-shelf purchase-of an operational system, it must prove to be survivable against projected threat systems in the 2020s and beyond. With this in mind, the ministry is continuing to fund research into LO capabilities running in parallel with the Taranis project. The control portion covers not only the RF but the infrared spectrum, with work undertaken to examine reducing the engine signature in terms of the jet efflux. The engine intake and jet efflux nozzle have also received considerable focus.

The U.K. continues to pursue a dual-track approach to the acquisition of a UCAV, since it remains involved with the U.S. in examining the operational utility of such systems. While an off-the-shelf purchase remains an option, issues surrounding what London terms operational sovereignty could militate against purchasing a system from Washington.

While Taranis will fly using Rolls's Adour 951, development of an operational UCAV could be accompanied by work on a new engine, or a project based on using a more advanced core than Adour's. Rolls-Royce had been pushing for an engine demonstrator project to run along with Taranis, but funding was lacking. The engine has a fundamental impact on the size of the UCAV, while some of the likely performance demands-both in loiter capability and power output for directed energy weapons-also drive a more-advanced propulsion solution.

The U.K. is pursuing development of high-power microwaves (HPMs) and laser weapons, with the UCAV certainly a clear candidate for an HPM payload.

The Rolls-Royce-Turbomeca relationship on Adour could yet continue in terms of UCAV propulsion. There have been suggestions that this could be an area of reemerging Anglo-French collaboration.

The six industrial partners involved in Neuron - Dassault Aviation, Saab, Alenia Aeronautica, EADS CASA, Ruag Aerospace of Switzerland and Hellenic Aerospace Industry - are also preparing to start production of their lone flight-test vehicle, now slated to undergo trials in 2011. The go-ahead for the production phase comes after months of validating technologies deemed critical to the operational concept. Developers created 13 technology road maps in which to tackle key issues before production go-ahead. The bulk of those are now complete, with good results, says Neuron program manager Benoit Dussauguey, Dassault's senior vice president for military sales and cooperation.

A special emphasis has been placed on LO technologies. Although some team partners, such as Dassault and Saab, have already dabbled in low observable shaping and materials - including applications on combat aircraft - Neuron is aiming at a level of stealth not attempted before in continental Europe. In part, it was only when development started that engineers realized how every design choice can impact stealthiness. Eight of the 13 technology efforts were related to radar and infrared low-observability.

For instance, Saab has built a model of the front forward-fuselage and the landing gear door for measurement at the outdoor radar cross-section facility in Linköping. The emitter is about 500 meters from the test specimen and therefore provides good radar return data, Dussauguey indicates.

Alenia is doing similar work. The company is assigned the window for the electro-optical sensor. Unlike on the F-35 Joint Strike Fighter, which features a protruding sensor window, Neuron designers have opted for one basically flush with the fuselage. The Italians also have run tests on a partial weapons bay door to gauge whether radar returns are meeting specifications.

Last year, Dassault ran tests of the leading and trailing edges of the air vehicle. Dussauguey says results were good, but the company is pursuing upgrades to further improve LO performance.

A key element of Neuron is the engine intake, which features radar-absorbing material. Tests are being evaluated. Preliminary design reviews for almost all Neuron systems have now been completed and developers are in the final stages of defining interface control documents so team members can proceed with detailed design activities and production. Orders for long lead items are likely to be on contract by year-end to begin the process of turning the €400-million (\$628-million) undertaking - which kicked off in 2004 and went to contract in February 2006 - from concept to reality.

The airframe shape has been largely frozen for well over a year, with only tweaks being applied. The vehicle is expected to be 9.3 meters (30.5 ft.) long and have a 12.5-meter wingspan. Maximum takeoff weight will be 5,000-6,500 kg. (11,000-14,300 lb.). Top speed is Mach 0.85, with 12-hr. endurance. Composites will feature heavily in the design.

The air vehicle will sport four control surfaces and two weapon bays, each sized for a Mk.82 bomb. Beyond the electro-optical sensor, it will be fitted with a line-of-sight data link, but no synthetic aperture radar or radar-warning receiver (although there will be provision for one).

Infrared signature suppression is also a watchword for engineers. Designing the exhaust assembly was another major technology demonstration area and a full-scale demonstrator was built. The first run of the Adour engine is due this month; the exhaust assembly is to be added a few months later. It includes a masking plate to shield the infrared signature from the ground. Engineers will be scrutinizing thermal and dynamic strains on the exhaust assembly during those trials. HAI built the full-scale nozzle from alloys since composites were deemed too costly.

The airframe and engine team also has worked closely to ensure that the S-shaped inlet to mask the turbojet's fan doesn't starve the engine of vital airflow. A series of wind tunnel tests has been completed with an inlet distortion grid to mimic the airflow impact on the inlet.

Coming trials will be done in three steps, first just running the power-plant, then adding the distortion grid and nozzle, and then the masking plate. Dussauguey notes that this gradual process should make it easier to get flight clearance approval from authorities.

System software also features heavily in the design. One technology road map dealt with validating the open architecture approach, which should allow companies to modify code for a subsystem they are developing without requiring the rewrite of the entire system software - the team settled on the Arinc 653 software design standard. Saab is writing the core underlying computer software, with a first version expected by early 2009.

Dassault is responsible for the fly-by-wire flight control software, which the company is adapting from its Falcon 7X long-range business jet. The Falcon 7X has greater redundancy than the Rafale fighter's fly-by-wire system, and with only one flight-test article, developers want as much safety margin as possible.

In fact, Neuron's airworthiness safety standard should be almost as good as that of the European Aviation Safety Agency's or FAA's requirement for commercial aircraft, Dussauguey says. Avionics, hydraulics and electrical systems will be fully redundant to meet JAR 23 civil airworthiness requirements.

As developers build the program, concern about loss of the lone vehicle is weighing on them heavily. In particular, Neuron officials realize what a significant setback EADS suffered when its Barracuda UCAV demonstrator crashed, and are mindful of the magnitude of Lockheed Martin's loss of the Polecat stealth endurance UAV. One lesson gleaned from Polecat is to design a more flexible flight termination system. If a flight has to be terminated but the problem can still be resolved before the vehicle crashes, Neuron operators will have the ability to retake control of the UCAV. Since most of the flight tests will be in sparsely inhabited areas, the flight termination process will also be gradual, rather than directly commanding the vehicle to fly into the ground or sea.

Aircraft autonomy - another key design driver - will also reflect the design-to-cost approach. Unlike existing UAV programs, which tend to be personnel intensive, Neuron will nominally require only a small ground staff. Controllers will merely provide waypoint updates, allowing the vehicle to replan its route automatically, taking into account programmed

threat information. Planners think this approach, which parallels work on other UCAV programs, will allow the vehicle to be controlled by just two individuals - and might even permit several vehicles to be handled by the same team. With the basic design process coming to its end, the Neuron team is getting ready to reduce the core team of 100-150 personnel now operating at Dassault's St. Cloud headquarters outside of Paris and standing up the «virtual plateau.» This will have engineers working at their dispersed sites. The core team will likely be reduced by half within a year. Although Neuron is not designed to be an operationally representative system - it is about three-quarters the scale of what a future production model would probably require - attention will nevertheless be on the flight-test program. Those trials will commence at the facility in Istres, France, where the vehicle also will be assembled. They will then move to Sweden, for LO trials and weapons release, before finishing up in Italy. Radar testing at different frequencies will take place in Rennes, France. Stealth measurements will be performed after a few flights, in part to assess the impact of flight operations on the radar cross-section. Flight trials will run around 18 months.

WARRIORS AND PREDATORS
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
July 14, 2008

The U.S. Army and Air Force are expected by October to finalize a plan to settle on a common Predator/Sky Warrior vehicle to reduce complications and save on costs to operate and maintain the similar Predator, Sky Warrior and Reaper fleets simultaneously. General Atomics Aeronautical Systems is conducting integration flight tests of its Block 1 Army Sky Warrior UAV, a derivative of the USAF Predator. Already, two of eight Block 0 aircraft, which include Sky Warrior's larger airframe and the heavy fuel engine, are in the Middle East.

BRITAIN, BAE TO DEVELOP ARMED MANTIS UNMANNED PLANE
By Tim Mahon
C4ISR, USA
www.c4isrjournal.com
July 15, 2008

The U.K. Ministry of Defence signed an agreement with BAE Systems July 14 to jointly develop an armed, unmanned aircraft known as Mantis, officials announced at the international airshow here. BAE signed on behalf of the industrial team that will co-fund the work together with the Defence Ministry. The BAE-led team includes GE Aviation, Meggitt, QinetiQ, Rolls-Royce and Selex Galileo, the same team that is addressing the series of capability demonstrations and developments under Britain's Strategic Unmanned Air Vehicles (Experimental) umbrella program. Exact levels of funding were not made public.

In its announcement, BAE described Mantis as a «long range deep and persistent strike» aircraft. The aim is to provide «full autonomy and extremely extended endurance,» said Mark Kane, managing director of autonomous systems and future capability at BAE. A mockup of the airframe, which Kane cautioned might not resemble the final article, reveals a low-winged monoplane structure with a high vertical fin and twin «pusher» turboprops pod-mounted on a stub wing, high up on the rear fuselage. The mockup also showed the weapon-carrying ability, mounting Paveway IV laser guided bombs and Brimstone air-to-surface missiles. «We would rather not box ourselves in regarding capabilities at the moment, since this is a technology demonstrator only, but we are interested in both [combat and surveillance] roles,» said Air Vice Marshal Simon Bollom, director general of air combat for the Defence Ministry.

Engineers will apply lower-cost, advance construction techniques developed in previous BAE programs, including Herti and its armed version, the Fury, an aircraft developers unveiled here. The Mantis program is intended to accelerate the insertion of advanced technologies into the field. «This is a significant step towards trying out new concepts and pulling them rapidly through to operations,» Bollom said.

Kane said designers chose a twin-engine configuration because of the desire to operate in a wider range of conditions and to win clearance to operate routinely in civil airspace, where safety is the paramount concern.

«We are addressing identified need for a larger, twin-engined very high endurance UAS for persistent ISR and other applications,» Kane said. The officials did not reveal the proposed flying endurance of Mantis. Officials began working on the Mantis program in late 2007, despite the announcement here at Farnborough. The current date set for first flight is early 2009.

PRESS RELEASE

Cobham Teams With GA-ASI to Provide UAV Whole Life Support to UK Mod
Cobham plc
July 15, 2008

Cobham plc (Cobham) and General Atomics Aeronautical Systems, Inc. (GA-ASI) are pleased to announce the creation of a Teaming Agreement to cover whole life support arrangements for UK Government GA-ASI products. This teaming arrangement will initially focus on the provision of support to the UK MoD MQ-9 Reaper unmanned aircraft system

(UAS) currently in operation with the Royal Air Force (RAF) over Afghanistan. The Team will develop support solutions that could be used by the UK MoD to offer increased flexibility and sovereignty over existing arrangements.

Andy Stevens, Chief Operating Officer Cobham said: «This Teaming Agreement enables us to apply all of the capabilities of our Aviation Services Division to deliver what could be a very important contribution to the UK MoD's operational UAV capability. This also emphasises the importance of the UK Defence Industrial Strategy and the part that we can play in service provision to the MoD in partnership with GA-ASI. We look forward to working with our US partner to deliver such support services as the UK MoD may require.»

Thomas J. Cassidy, Jr., President, Aircraft Systems Group, GA-ASI commented: «The multi-mission Predator B has demonstrated superior reliability, affordability and surveillance capabilities, and UK forces are now witnessing the aircraft's proven reconnaissance and strike capabilities first-hand. By teaming with Cobham, a UK industry leader, we have taken the next step to ensure that UK Reaper operations can continue to be backed by timely, flexible, integrated logistics support.»

Assistant Chief of the Air Staff, Air Vice-Marshal Tim Anderson made the following statement: «RAF Reapers are continuing to prove and expand their versatility and effectiveness across their current theatre of operations and roles, making a real difference and saving lives. We welcome the teaming arrangement between GA-ASI and Cobham as it will build on a well-established relationship to offer the prospect of increasingly responsive and effective support to these key systems.»

Jonathan Barratt, the Strategic Unmanned Air Vehicle Experiment (SUAVE) Integrated Project Team Leader (IPTL) also stated that: «The teaming arrangement provides us with the potential for UK to increase flexibility and robustness of support and the ability to develop UK industry's UAS support capabilities in line with MOD Defence Industrial Strategy. We look forward to the team's proposals.»

PRESS RELEASE

Raytheon's TCS is 1st NATO Standard Unmanned Ground Control System Raytheon, Falls Church, Va., USA July 15, 2008

Raytheon Company's Tactical Control System has been certified as the first NATO standard unmanned ground control system. An industry first, it is the only ground system conforming to the NATO STANAG (Standardization Agreement) 4586 standard for the U.S. Navy Tactical Control System (TCS).

NATO ratified the STANAG 4586 standard, enabling allied nations to share information from unmanned aircraft through a common ground control system. NATO-compliant aircraft are equipped to translate information into standard message formats, and information received from other compliant aircraft can be transferred into vehicle-specific formats for seamless interoperability.

«This is a significant first for the unmanned aircraft system technology community and the Navy,» said Mark Bigham, director of business development for Raytheon's Tactical Intelligence Systems unit. «For more than 40 years, Raytheon has been at the forefront of developing the latest unmanned ground systems for our customers, and we have incorporated that heritage into the TCS system.»

TCS provides the Navy with an advanced ground system that can control two dissimilar air vehicles. The Navy's MQ-8B Fire Scout by Northrop Grumman will be the first air vehicle to use this STANAG 4586-conforming software. The control system consists of mission planning, command and control, data processing and dissemination capabilities for operation of the full range of tactical unmanned aircraft systems.

«Proving an open user interface enables the unmanned aircraft system operator, trained on one system, to control different types of UAS payloads with minimal additional training,» Bigham said. «TCS also has a 'plug-and-play' capability that allows for seamless integration.»

PRESS RELEASE

Rolls-Royce Selected to Power Mantis Demonstrator Rolls-Royce, UK July 15, 2008

Rolls-Royce has been selected to power a new UK Ministry of Defence Unmanned Autonomous System (UAS). The Mantis Advanced Concept Technology Demonstrator programme will help inform the UK's future UAS capability. Rolls-Royce is working in conjunction with BAE Systems, who are leading the Mantis programme, to lead the development of an Integrated Power System (IPS) which integrates the twin engines and propellers and associated sub-systems. This capitalises on the company's expertise in the field of turboprop propulsion.

Martin Fausset, Rolls-Royce Managing Director - Defence Aerospace, said: «Our involvement in the Mantis programme demonstrates a significant milestone in the delivery of the Rolls-Royce integrated power capability and further improves our ability to take advantage of the many opportunities that are likely to arise in this exciting market.»

Graham Hopkins, Rolls-Royce Director of Engineering - Defence Aerospace said: «We have moved beyond the basic

supply of an engine. Mantis enables us to take the next step towards providing unmanned aircraft with an Integrated Power System that will intelligently combine, optimise and control all the necessary sub-systems to ensure the effective provision of both propulsive and electrical power.»

DOUBLE BILL

U.S. Navy Prepares to Send M H-60R Seahawk and MQ-8B Fire Scout to Sea

By Graham Warwick

Aviation Week & Space Technology, USA

www.aviationweek.com/awst

July 16, 2008

With international interest in its new-generation Seahawk shipborne helicopters growing, the U.S. Navy is gearing up to take the next step - integrating manned and unmanned rotary-wing operations on its warships.

Two new versions of the Sikorsky-built Seahawk are replacing six different Navy helicopters. The anti-submarine/anti-surface warfare MH-60R «Romeo,» for which Lockheed Martin is prime contractor, will serve alongside the multi-role MH-60S «Sierra,» which has been operational for a year.

The Romeo will replace both the sonobuoy-dispensing SH-60B «Bravo» and the sonar-dipping SH-60F «Foxtrot» and combines the capabilities of both in a single tightly packed airframe. The Sierra is replacing helicopters ranging from the vertical-replenishment CH-46D to the special-operations HH-60H. «They have common cockpits, but divergent missions,» says Capt. Dean Peters, H-60 program manager.

In January 2009, 11 Romeos, along with eight Sierras, will embark on the aircraft carrier USS *Stennis* for the MH-60R's first operational deployment. Six will detach to operate from smaller ships. This marks a departure-Bravos have never operated from carriers - and is the result of combining two helicopters in one.

At about the same time, the Navy's Northrop Grumman MQ-8B Fire Scout vertical takeoff and landing unmanned air vehicle (VTUAV) will be at sea preparing for its operational evaluation. The autonomous helicopter will operate alongside an SH-60B on an FFG-7 Perry-class frigate, likely the USS *McInerney*, and be flown and maintained by the Seahawk's crew. Delays to the Fire Scout's intended host, the Navy's Littoral Combat Ship, resulted in the decision to conduct opeval on an existing ship, but in doing so has created the potential for its early deployment, says Capt. Tim Dunigan, VTUAV program manager. This could lead to Fire Scouts becoming operational alongside Seahawks as early as October next year.

The Navy plans to procure 298 Romeos and 271 Sierras. The potential export market is estimated to be 200 helos, roughly split between 125 Romeos and 75 Sierras, says Steven Osborne, director, international programs, at Naval Air Systems Com-mand. Some 10 or 11 countries have expressed interest, and «a number» have requested and been provided price and avail-ability data, he says. The earliest potential sale is in Fiscal 2010, «possibly late 2009.»

Several countries interested in the Romeo have also looked at the Sierra because of its multi-mission capabilities, says Osborne. Working together within the Navy, the Romeo will provide the eyes and the Sierra the muscle, says Peters. The Romeo has a basic weight of 18,000 lb. and carries 4,000 lb. of fuel, providing 3-3.5 hr. on station. The Sierra has a basic weight of 15,000 lb., carries half as much fuel, but can lift a 6,000-lb. external load on a vertical replenishment mission.

The MH-60R combines the capabilities of the SH-60B and -60F, then adds some. «The Romeo is the most sophisticated helicopter in the world right now,» states Peters. Already bristling with sensors and antennas, there are several upgrades in the works, including Link 16 and K_u band data links, new radar modes and an improved interface for the sensor operator.

Principal sensors are Raytheon's AAS-44 electro-optical/infrared turret on the nose; Telephonics' APS-147 multimode radar under the fuselage; Raytheon's ASQ-22 dipping sonar in the cabin; and Lockheed Martin's ALQ-210 electronic support measures (ESM). The EO/IR sensor includes a laser designator for the Hellfire missile-four can be carried on the left-hand stores pylon. A right-hand pylon will be added next year, says Lt. Cdr. Juan Gutierrez, MH-60R/S test and evaluation lead. The APS-147 provides an inverse synthetic-aperture radar target-imaging mode not available on the Bravo. A contract is imminent to develop an automatic radar periscope detection and discrimination (ARPDD) mode for the APS-147, with two years of testing slated to begin in mid-FY'10. The radar can detect thousands of small targets, and ARPDD will pick out periscopes from small boats, buoys, debris and other clutter.

The pneumatic launcher with its 25 active and passive sonobuoys has been moved out 6 in. to make room for the ASQ-22 airborne low-frequency sonar (ALFS) and its winch system, which is a mission kit. «We're buying three for every four helicopters,» says Ed Chermansky, MH-60R integrated program team lead. Sitting in the cabin, and with an integrated passive/active acoustic display, only the sensor operator can run ALFS, which averages five times the detection range of the SH-60F's dipping sonar, Peters says. The Romeo will carry the Mk.54 lightweight torpedo, but no anti-ship missile. Hawklink, the dedicated data link that allows the ship to see what the helicopter sees and operate its sensors remotely, is being upgraded from C- to K_u-band to increase bandwidth and allow the new Seahawk to talk to the carrier. The K_u band link is in testing and will be deployed in 2011. Link 16 is also being fitted to Romeos and Sierras to provide access to the widely used tactical network. The Romeo also introduces satellite communications to the Seahawk.

Four antennas around the airframe, two more than on the Bravo, allow the ESM system to perform passive targeting of emitters by measuring the angle of arrival of signals. With increasing emphasis on littoral operations, the Navy is weighing Romeo's defensive suite, including incorporating a radar-warning capability into the ESM, says Peters. The helicopter

is equipped with AAR-47 IR missile and laser-warning systems; ALE-47 chaff-and-flare dispensers firing forward and downward; and ALQ-144 «disco ball» IR jammers above and below the fuselage.

The Sierra has infrared exhaust suppressors, the Romeo has not, but Sikorsky has been testing upturned engine exhausts that could offer a lighter solution for the MH-60R. There is an issue of interference with blade folding on the Seahawk, but this could be overcome, says Peters. The Sierra is based on the Black Hawk airframe and the Romeo on the Seahawk. Externally, the main distinguishing feature is the tailwheel, located further forward on the Romeo to fit small ship decks. Sierras in service have been found with cracks in secondary structure. These are being repaired in the field and do not affect the Romeo, according to the Navy.

«The Sierra is truly a multi-mission platform,» says Peters. Aircraft are being delivered in three configurations, including mine countermeasures (Block 2) and armed helicopter (Block 3). Six of the Sierras are configured as air ambulances. The armed helicopter uses a variant of the MH-60K's external stores wing and the same EO/IR sensor as the Romeo, but mounted «ball down,» which improves its performance.

In airborne mine countermeasures configuration, an operator console and auxiliary tanks are installed in the cabin. The console can operate any of the systems: AQS-20 towed side-looking sonar; ALQ-220 towed acoustic-magnetic sensor; and AES-1 laser mine-detection system. To neutralize mines the Sierra can carry wire-guided mini-torpedos and a 30-mm. gun that fires laser-guided supercavitating rounds.

The towing mechanism has proved troublesome. «The tow point under the tail is a challenge,» says Peters. «The winch system reliability issue is almost solved, but we've pulled it out of test to fix it as we will not field an unreliable system.»

Once the Fire Scout enters service, the concept of operations is to use the UAV for target identification, rather than detection, says Dunigan, cueing its sensors from the H-60, the ship, or other surface or airborne platforms. Initially, the Fire Scout is equipped with a Flir Systems Brite Star II EO/IR sensor, with laser rangefinder/designator, that will send full-motion video back to the ship. The UAV also carries three ARC-210 radios for voice relay.

Northrop Grumman's Cobra multi-spectral mine detection payload is to become operational on the Fire Scout in Fiscal 2010, as a plug-and-play replacement for the Flir. Development of a multimode maritime radar will begin in Fiscal 2009 for initial operational capability in 2011. This will serve in addition to the EO payload to increase the UAV's overland capability. A demo will be conducted this year using off-the-shelf Telephonics RDR-1700B maritime surveillance and imaging radar.

Development testing of the Fire Scout will include two at-sea sessions planned for January and March 2009 to check how the air vehicle behaves in the airflow over the ship chosen for operational evaluation. This is currently the *McInerney*, but could change. «It's not been on this type of ship before,» says Dunigan. Opeval is set to begin in May and be completed in June. There are two options to equip the ship: full integration of the ground station into the combat information center would leave a residual capability and is the desired option, says Dunigan. «Full integration is what we'll aim for, but the timetable for modification is not very long by ship alteration standards.» Alternatively, the equipment can be installed in a roll-on/roll-off container and lashed to the deck.

In addition for mounting antennas for comm links and the Sierra Nevada UCARS automatic recovery system, a grid for the Fire Scout's harpoon deck-lock system must be added to the ship's flight deck without interfering with operation of the SH-60, which uses the RAST haul-down recovery system.

The *McInerney*'s helicopter detachment will be trained to operate the Fire Scout during opeval. The Navy's concept of operations is for a hybrid detachment of one H-60 and up to three Fire Scouts per ship. «A single H-60 detachment is 18 people, which we will augment with five maintainers,» says Dunigan. «These 23 people will operate and maintain the H-60 and the Fire Scout. They will be dual-qualified. The H-60 pilots will be the air vehicle operators, and the sensor operators will be the mission payload operators.»

HERTI GETS PUNCH
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
 July 16, 2008

BAE Systems and Thales are working on an armed derivative of BAE's Herti unmanned aerial vehicle, dubbed Fury. Trials are underway to fit the UAV with the Thales Lightweight Multirole Missile (LMM) now in development. Captive-carry trials of the LAM store have been conducted as has a static live-fire test. BAE and Thales have yet to conduct a guided airborne launch of a live weapon. These trials will be used to show safe separation and that the vehicle's systems are capable of guiding the weapon to target. The LMM will likely use a laser-beam riding, semi-active laser guidance combination. Target acquisition, designation and tracking are provided by on-board systems, while target confirmation and final launch authority are given by the ground station operator. The LMM weighs 13 kg. (28.6 lb.), and has a range of 6,000-8,000 meters (3.75-5 mi.).

REAPER DELIVERS GRIM PACKAGE
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
 July 16, 2008

The RAF used the General Atomics MQ-9 Reaper to fire a weapon during combat operations in Afghanistan for the first time at the beginning of this month. The Reaper can carry the GBU-12 Paveway II laser-guided bomb and AGM-114P Hellfire laser-

guided missile. The U.K. ordered three MQ-9s to meet an urgent operational requirement, with one already destroyed.

SMALL SHOTS

Aviation Week & Space Technology, USA

www.aviationweek.com/awst

July 16, 2008

A small air-to-surface missile developed as a private venture by Raytheon has been deployed on the Predator UAV by an unidentified U.S. customer. The Griffin munition is a 45-lb., 42-in.-long tube-launched missile with semi-active laser guidance and provides the Predator with an organic, self-targeted direct attack capability. Raytheon was awarded a \$9.3-million contract to supply the weapons in early May. Up to three of the low-cost missiles can be loaded for every Hellfire the Predator now carries. Raytheon also will demonstrate a guided firing of the U.S. Navy-developed Spike fire-and-forget missile from its KillerBee small tactical UAV later this year.

UNMANNED ASSAULT

Smaller players prepare to take on defense primes for new U.S. UAS programs

By Bettina H. Chavanne and Graham Warwick

Aviation Week & Space Technology, USA

www.aviationweek.com/awst

July 16, 2008

Industry is circling around two programs that promise to be the only major near-term U.S. procurements of new unmanned aircraft: the U.S. Navy/Marine Corps Small Tactical Unmanned Aircraft System (Stuas) and the U.S. Air Force's Next Generation Unmanned Aerial System (NG UAS).

Both look set to be contests between the Pentagon's established aircraft primes and the smaller players that characterize the fast-evolving UAS industry. They will also test whether the incumbent providers can hold their ground against the heavyweight primes.

The Stuas customers want an abbreviated, one-year development program, which demands a system close to off-the-shelf. NG UAS is also on an aggressive schedule, with service entry in 2015, that calls for solutions already close to hand. But while potential Stuas contenders were abundant at the Assn. for Unmanned Vehicle Systems International show here last week, it was hard to find even one design that hinted at NG UAS.

The Stuas competition will kick off with an industry day on June 24. The requirement is for a 150-lb.-class tactical UAV capable of ship and land launch and recovery. The Navy plans to use Stuas for fleet protection, while the Marine Corps will use what it calls Tier 2 for organic persistent intelligence, surveillance and reconnaissance (ISR).

For the Navy and Marine Corps, Stuas/Tier 2 will replace the UAS services provided by Boeing and Insitu using the ScanEagle. The Air Force may join the program later and use the system for base protection.

The draft request for proposals was expected on June 13 and the final RFP in late August, leading to a contract award in June 2009. Some contenders have already declared their hands, but Navy and Marine Corps' requirements have been in flux and several companies are waiting to see the RFP before deciding whether to bid, and with what.

Insitu is planning to offer its Insight UAS as prime, without Boeing, and Raytheon is teamed with Swift Engineering to propose the KillerBee. Textron's AAI is expecting to offer a version of its Aerosonde UAS. Northrop Grumman says it will decide whether to bid after reviewing the RFP. Lockheed Martin's Skunk Works looked at designing a new vehicle, says Dennis Rizzardi, senior manager for unmanned systems, but any bid will now be led by the company's Maritime Systems & Sensors business.

Insitu's strategy is to bid as a small-business prime, says Steve Nordlund, vice president of business development. The company has teamed with two small engineering companies that have experience on government programs, but has not ruled out seeking a larger partner. «As the draft RFP comes out, we will continue to engage in discussions, but right now we think our best approach is a small-business strategy,» he says.

Insight is larger than ScanEagle, but will use a common rail launcher and Skyhook recovery system. Swift's KillerBee is rail-launched and net-recovered, and Raytheon says the advantage of its blended wing-body design is its greater payload capacity and structural integrity, says Ryan Hartman, Stuas capture team lead. AAI says it may have to scale up the Aerosonde and is still evaluating launch and recovery options.

A heavy-fuel engine is an objective requirement for Stuas, for shipboard safety. Nordlund says the Insight will be offered with the engine as baseline. Hartman says Raytheon will test one in its Cobra UAV testbed, then transition it to the KillerBee. AAI says it is evaluating heavy-fuel engines, but has yet to fly one.

«Stuas is one of the few UAV new starts that is funded and supported,» says Rizzardi, who expects at least 10 bidders to respond to the RFP. Although the Skunk Works decided not to bid on Stuas, it is looking at NG UAS. «A hunter/killer follow-on to Predator lines up right in our market space,» he says. Raytheon plans to bid, as do Boeing, Northrop Grumman and the incumbent provider, General Atomics Aeronautical Systems Inc. (GA-ASI).

USAF wants the NG UAS to be faster, fly higher and have greater payload capacity than the MQ-9 Reaper (Predator B). A request for information (RFI) is imminent, and the service wants an initial operating capability (IOC) in 2015.

GA-ASI says it will fly its contender, the long anticipated jet-powered Predator C, in the fourth quarter. But Lockheed Martin

and Raytheon officials believe one of the motivations behind NG UAS is a USAF desire to break the Predator monopoly. They expect the next-generation UAS to take over from the Reaper as the armed hunter/killer, while the MQ-1 Predator A is refocused on ISR.

The Skunk Works is looking at various concepts, says Rizzardi. «We can make a lot of improvements over the Predator, so we fully intend to play in NG UAS.» Northrop Grumman says it participated in two previous study phases, providing ideas on a «revolutionary hunter/killer concept.» Raytheon plans to respond as a prime, and says there are several vehicle providers with which it could team.

Rizzardi expects the RFI to lead to an analysis of alternatives and eventually to a program of record, but he says the Air Force will need to find money for NG UAS in the Fiscal 2010 budget now taking shape if it is to achieve IOC in 2015.

ALENIA WANTS ROLE IN NEW EUROPEAN UAV PLANS

By Tom Kington

C⁴ISR, USA

www.c4isrjournal.com

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Alenia Aeronautica wants in on one of the new pan-European UAV efforts recently announced, CEO Giovanni Bertolone said July 16.

«We want to be involved in one of the two plans,» said Bertolone, referring to two competing medium-altitude, long-endurance (MALE) UAV proposals - one offered by Thales and Dassault, the other by EADS. The latter is backed by France, Germany and Spain, which are funding risk reduction, while Thales and Dassault have made an unsolicited offer aimed at France and Spain. Bertolone said that a plan to work on a MALE UAV with Dassault and Saab, announced at last year's Paris Airshow, is still alive. Bertolone also announced that Alenia's Sky-X UAV has completed maneuvers with an Italian C-27J to simulate automated in-flight refueling.

The Sky-X carried out all chasing, approaching, alignment and refuelling simulation maneuvers, using its mission computer and GPS/optical chasing systems, while the C-27J flew at 140 knots and 6,000 feet before returning to Italy's Amendola Air Base, Bertolone said.

Selex Galileo, a fellow Finmeccanica unit, is also marketing a UAV, the Falco, which has been sold to one customer - reportedly Pakistan, although the firm has declined to name the buyer.

Selex Galileo CEO Steve Mogford said July 16 that the medium-altitude, surveillance Falco now is involved in «successful combined operations for the client,» while the company said in a statement that all pilots for the buyer had been trained and the system is fully operational.

SECRET FLEET

Armed forces deploy various air platforms on crucial SIGINT missions around the world

Martin Streetly assesses their capabilities

Jane's Defence Weekly, UK

www.jdw.janes.com

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Like many of today's military technologies, airborne signals intelligence (SIGINT) collection has undergone profound changes since Operation 'Desert Storm'.

Prior to the 1990-91 Gulf War, airborne SIGINT was primarily a strategic activity, with a heavy emphasis on 'bean counting' air-defence radars (electronic intelligence, ELINT), monitoring military and political communications networks (communications intelligence, COMINT), establishing the technical parameters of strategic missiles (via the interception of associated telemetry traffic: telemetry intelligence, TELINT) and military emitters such as radars (technical intelligence, TECHINT).

Operation 'Desert Storm' marked the first attempt since the Vietnam War to employ SIGINT collected by air vehicles (AVs) in a tactical context, where acquired data could be used in real or near-real time to inform warfighters of threats and enemy intentions during operations.

Subsequent operations in the Balkans and particularly during the United States' 'global war on terror' have driven this process to the point where SIGINT platforms can now be used to detect, track, identify and monitor the fleeting, telephone-based/short-range radio communications employed by insurgents and pass the derived intelligence to warfighters in executable engagement times. Equally, ELINT and COMINT capabilities have become a standard component in multi-sensor platforms of the types used for maritime, economic exclusion zone and homeland defence surveillance applications.

In terms of technology, the basic laws of physics have not changed and today's SIGINT hardware functions in much the same way as its forebears.

What has changed is the ability to miniaturise; to integrate subsystems into open architectures that are much more easily upgraded (either as software fits or as hardware 'plug and play' drop-ins); to make use of commercially derived software and hardware in an environment that has traditionally been bespoke; to provide communications links (including machine-to-machine) that can provide real-time data hand-off for 'shooters'; and to process data in a way

that is a quantum leap forward in terms of what information can be extracted from a particular intercept. Such capabilities represent the high end of the genre and it is with these dedicated SIGINT platforms, rather than multisensor AVs, that this survey concerns itself. *Jane's* has identified 20 countries around the world that operate dedicated airborne SIGINT platforms.

Surveillance Platforms

The first thing to be said about Australia's 'Peace Mate' programme is that its existence has never been officially confirmed and no photographs of either the C-130 or P-3 aircraft supposedly involved have ever surfaced in the public domain.

That said, *Jane's* analysts believe the Royal Australian Air Force does operate single examples of 'Peace Mate'-configured C-130 and P-3 SIGINT aircraft, with the latter understood to have been outfitted by US contractor Raytheon (subsequently L-3 Communications Integrated Systems [L-3/IS]) during 1995-97. They are thought to be able to undertake COMINT collection within the 3 MHz to 3 GHz frequency range, being equipped with a satellite communications capability. The 'Peace Mate' C-130 is reported as having been modified by Australian contractor Tenix, as making use of a predominantly US-sourced mission suite and (like its P-3 counterpart) as being equipped with a satellite communications capability.

A little more certain is Chile's continued use of at least one of three Hawker Beechcraft 99A utility transports that have been locally modified for ELINT work under the 'Petrel Beta' designation. The capability centres on the 30 MHz to 18 GHz band Desarrollo de Tecnologías y Sistemas (DTS) Itata ELINT system that incorporates analysis and direction-finding workstations. According to *Jane's* sources, Petrel Beta entered service in 1970, with three examples being reported as being operational during 2006.

Maintaining the enigmatic theme, China's airborne SIGINT capability appears to be vested in one or more variants of the Shaanxi Y-8 transport aircraft. As such, the capability appears to be part of the High and New (HN) programme, with subprojects 'HN 2' and 'HN 4' being suggested as SIGINT platforms. Alongside these, a model of a Y-8 equipped with the CEIEC KZ800 ELINT suite was displayed in April at the Defence Services Asia (DSA) 2008 trade show.

Covering at least the 1-18 GHz frequency band, the KZ800 system is understood to comprise multi-operator equipment that is designed to detect, analyse (parameter measurement), identify and locate land-based and shipborne radars that are associated with air-defence networks and gun/artillery/missile fire control systems.

Of the two HN configurations, *Jane's* sources identify HN 2 as being the Y-8DZ that was first spotted during mid-2004 and is said to be in service with the People's Liberation Army (PLA) Navy's 1st Independent Air Regiment. HN 4 has been associated with both the Y-8T and YG-8 designations and is reported as being in service with the PLA Air Force. Of the two, HN 4 makes the most convincing SIGINT platform, particularly as it shares several external features and antenna arrays with the previously noted DSA 2008 display model.

Elsewhere within the Chinese military, the air force is known to have been operating at least one Tu-154 airliner that appears to have been modified for SIGINT. This aircraft was first identified during the mid-1990s.

Moving to the Middle East, the Egyptian Air Force (EAF) has acquired at least two (and possibly four) Hawker Beechcraft 19000-1 aircraft, together with two EC-130H transport aircraft for use as SIGINT collectors. The 19000-1s (possibly designated as the 19000-1E variant) are understood to be equipped with a variant of the ESL/TRW (subsequently Northrop Grumman Mission Systems) ES5000 SIGINT suite that operates in four specific sub-bands (3-30 MHz, 30-300 MHz, 230-1,000 MHz and 300-3,000 MHz) within the 3-3,000 MHz frequency band. Other onboard equipment includes an air-to-ground datalink and, while not confirmed, the EAF's electric 19000-1s have been associated with its No 81 Squadron. Egypt's EC-130Hs are thought to be COMINT platforms that were outfitted by the then E-Systems (subsequently L-3/IS) and delivered circa 1978. In July 2003 the US Defence Security Cooperation Agency flagged up a potential USD60 million sale of two roll-on/roll-off ELINT systems for installation aboard two «existing» Egyptian C-130H aircraft. To date, the consummation of this deal remains uncertain.

Enigmatic Mission

Meanwhile, the French Air Force's Airborne Electronic Squadron 1/54 operates a pair of C-160G Gabriel SIGINT aircraft that were first fielded in 1989. Configured for both COMINT and ELINT, the Gabriel provides accommodation for nine systems operators and has a mission suite that was originally built around Thales-sourced COMINT receivers and analysis gear, together with the same company's 0.5-40 GHz Analyseur de Signaux Tactiques (ASTAC) ELINT system. While not confirmed, *Jane's* believes these aircraft have been progressively upgraded during their service lives.

The German Navy's Naval Air Wing 3 operates a pair of Br-1150 Peace Peek SIGINT aircraft. Again equipped for the role by the ubiquitous E-Systems, the Peace Peek aircraft have been the subject of at least one major mission-suite upgrade and are scheduled to be replaced by the Euro Hawk unmanned aerial vehicle (UAV).

Based on the RQ-4 Block 20 airframe, the Euro Hawk SIGINT platform will be equipped with an EADS-developed COMINT/ELINT payload that covers the 30 kHz to approximately 30 GHz frequency band. As currently scheduled, the first Euro Hawk platform will be delivered in 2010 and, if successful, will be followed by four additional AVs during 2011-14.

The Israel Air Force's No 122 Squadron employs three Gulfstream V Shavit (Comet) SIGINT aircraft that are

equipped with the Elta EL/I-3001 airborne integrated SIGINT system. The baseline EL/I-3001 offers both COMINT (20-1,200 MHz band) and ELINT (0.5-18 GHz band) capabilities. Operated by a 12-strong mission crew, the Shavit architecture incorporates both satellite communications and a datalink and is believed to have been used operationally for the first time in August 2006.

Israeli industry is also the source of the EL/K-7071 COMINT and EL/L-8385 ELINT payloads and the EL/L-8300 SIGINT suite that are believed to have been installed aboard the Indian Navy's four Israel Aerospace Industries Heron UAVs and Israeli C-130H SIGINT plat-forms respectively.

The Heron UAVs are assigned to India's Navy Air Squadron 342 and, while photographic evidence shows installation of the antenna arrays associated with the cited SIGINT payloads aboard such AVs, the payloads themselves may not be fitted. Use of an EL/L-8300 configura-tion aboard Israel's supposed pair of SIGINT C-130Hs is suggested by a 2001 Elta brief that noted installation of four such systems aboard Hercules transport aircraft.

Elsewhere within the Indian intelligence community, the Aviation Research Centre (ARC) includes a Boeing 707-337C SIGINT platform in its inventory of fixed- and rotary-wing aircraft. Characterised by 'cheek' antenna fairings, the ARC's B-707, which has been based at Indira Gandhi/Palam International Airport near Delhi, has been variously reported as being equipped with either a US or an Israeli mission suite. Jane's analysis leans towards the former because E-Systems documentation and the CIA's involvement in the establishment of the ARC during the 1960s supports this view. India's known airborne SIGINT capability is rounded out by the 'information warfare' Do 228-201 aircraft operated by Naval Air Squadron 310. Such aircraft are equipped with a multiport antenna array at each wingtip and have been variously reported as being equipped with the 0.5-18 GHz Elisra AES-210/E Emerald electronic support (ES)/ELINT system or Bharat's up to 18 GHz Airborne ES System (AESS).

The Italian Air Force's 14th Wing includes a single G222VS SIGINT aircraft within its inventory. The G222VS is understood to be equipped with both Italian and US-sourced mission equipment and as providing accommodation for 10 system operators. Entering service in 1981, the G222VS is deemed to be in need of replacement, with a roll-on/roll-off capability installed aboard a C-130 being a mooted alternative. However, no replacement has been funded to date.

Naval Patrol

Turning to East Asia, both Japan and South Korea operate SIGINT aircraft, with the former's capability being primarily vested in the Japan Maritime Self-Defence Force's (JMSDF's) EP-3 platform.

Based on a Kawasaki-built P-3C maritime patrol aircraft airframe, the EP-3 was first flown in October 1990. It is equipped with a mission suite that covers the 30 MHz to 20 GHz frequency band and has been jointly developed by Japanese contractors NEC ('low'-band segment) and Mitsubishi ('high'- band segment). The designations NH/LR- 107 and NH/LR-108 have been authoritatively associated with the two subsystems, although the specific nomenclature to band coverage relationship remains unclear. Elsewhere, the type is reported as being flown and operated by a crew of 23 and as having both TELINT and SIGINT capabilities. The JMSDF has acquired five EP-3 aircraft that are assigned to its 81st Squadron.

The Republic of Korea Air Force (RoKAF) operates a quartet of Hawker 800SIG SIGINT configured business aircraft (also known as the RC-800 or the 'Paekdu/Peace Pioneer' plat-form) as part of the surveillance capability that is used to monitor the activities of its north-ern neighbour on the Korean peninsula. Like many other platforms, the Hawker 800SIG is fitted with a COMINT/ELINT system that was developed by E-Systems and which is quoted as having an upper frequency limit of 40 GHz. While not confirmed, the RC-800s may be assigned to the RoKAF's 39th Tactical Recon-naissance Wing.

Elsewhere in the region, both Singapore and Taiwan are understood to operate single examples of SIGINT-configured C-130s. The Singaporean platform is thought to have been outfitted by Israeli industry and is said to cover the 3 MHz to 3 GHz COMINT band.

Taiwan's C-130HE has been developed by a consortium of Lockheed Martin and the country's Chung Shan Institute of Science and Technology and is reported as having been assigned to the Taiwanese Air Force's No 6 Squadron. The Royal Thai Air Force's No 402 Squadron operates three Arava 201 transports that have been outfitted with an Israeli SIGINT system.

Returning to a European orbit, Poland, Spain, Sweden and the UK have all fielded air-borne SIGINT platforms. The Polish Air Force operates at least one (possibly three) W-3RR Procjon-3 SIGINT helicopters equipped with a Polish-developed mission suite that incor-porates two operator consoles and covers the 20-18,000 MHz frequency band.

Within the Spanish Air Force, the 47th Mixed Group operates a single Boeing 707-351C SCAPA aircraft that is configured for both electro-optical (EO) imaging and SIGINT collection. As originally developed, the SCAPA platform made use of hardware from the Elta EL/L-8300 COMINT/ELINT suite married to core software created by local manufacturer Indra.

The Swedish Air Force's 17M Wing includes a pair of S 102B Korpen (Raven) SIGINT aircraft that are based on the airframe of the Gulfstream IV business jet. Operated by a systems crew of four, the Korpen capability is based around a variant of TRW's Wideband Tactical Surveillance System (WTSS), which provides 20 MHz to 2 GHz band COMINT and up to 40 GHz ELINT coverage. Like many other applications of its kind, WTSS incorpo-rates an air-to-ground datalink.

Intelligence Collection

The UK Royal Air Force's (RAF's) No 51 Squadron is equipped with a trio of Nimrod R Mk I SIGINT aircraft that are capable of COMINT and ELINT functionality. Since coming into service in 1973, the Nimrod R Mk 1 has been the subject of two major upgrades and has been slated for a third.

In the first instance, the 1992 Starwindow effort is understood to have been aimed at the platform's COMINT subsystem and incorporated a network of 22 new digital receivers. The 1998 Project Extract addressed the modernisation of the aircraft's ELINT capabilities and was rebaselined during 2002 to incorporate new antennas and front-ends; some automatic functionality; a central database; and data fusion provision. Extract was completed during September 2003 and was to have been followed by Project Helix, which would have given the Nimrod an open architecture. However, Helix appears to have withered on the vine as the RAF mulls whether to replace the aged Nimrod with a new platform. Possibilities include the lease of a number of US RC-135V/W 'Rivet Joint' (RJ) platforms.

The US itself fields a considerable airborne SIGINT capability, with dedicated platforms being operated by the US Air Force (USAF), US Navy (USN), US Army, the Air National Guard (ANG) and the Customs and Border Protection (CBP) agency.

The USAF capability is vested in two RC-135U 'Combat Sent' TECHINT, 17 RC-135V/W RJ COMINT/ELINT, three RC-135S Cobra BALL TELINT and 28 or so U-2S aircraft. Of these, the latest detailed RJ configuration is the Block 8, which is designed to provide an enhanced SIGINT collection capability, automated information dissemination, improved system reliability and enhanced user friendliness.

The Block 8 configuration can be recognised by its revised ventral antenna array and is expected to be joined by a Block 9 update in 2008-09. The RC-125U/V/W/S aircraft are operated by the USAF's 55th Wing. The RJ architecture also appears to form the basis of Saudi Arabia's pair of RE-3AB SIGINT aircraft.

The ultra high-altitude U-2S' SIGINT capability takes the form of the Senior Glass COMINT/ELINT collection subsystem, a fully digitised variant of which was fielded during 2001. The U-2S has also acted as the testbed for Northrop Grumman's next-generation Airborne Signals Intelligence Payload (ASIP), five examples of which are expected to be used operationally by the U-2 fleet.

Looking to the future, the U-2S is scheduled to be replaced by the RQ-4 Global Hawk UAV starting in 2012. The RQ-4 Block 40 will carry an ASIP payload and Northrop Grumman is known to be undertaking work on ASIP applications for the US RC-12S 'Guardrail' SIGINT platform and the USAF's MQ-1 (ASIP-IC) and MQ-9 (ASIP-2C) UAVs. The U-2S is operated by the USAF's 9th Reconnaissance Wing.

The USN currently operates a fleet of 16 EP-3E COMINT/ELINT collection aircraft, the latest known update of which is designated as the Joint SIGINT Avionics Family (JSAF) Modernisation (JMOD) configuration. Launched in 2005, the JMOD was originally intended to be developed incrementally, with Spiral 1 introducing enhanced frequency coverage and Link 16 connectivity (amongst other things), Spiral 2 adding a data fusion/decision-making capability and Spiral 3 introducing a better low-band signal collection/direction-finding capability, remote tuning receivers and new antenna arrays (amongst others).

As currently planned, the EP-3E is set to be replaced by a new EP-X aircraft that was originally baselined to offer the same SIGINT capability as JMOD Spiral 3. Although billed as an EP-3E replacement, EP-X will be a multi-sensor platform that will incorporate SIGINT, radar and EO sensors. Aircraft in the service's current EP-3E fleet are assigned to USN squadrons VQ-1 and VQ-2.

Within the US, the service is recapitalising 33 of its RC-12K/N/P/Q 'Guardrail' COMINT/ELINT aircraft to a common RC-12S standard that will introduce the Communication High Accuracy Location Subsystem-Compact (CHALS-C) geolocation system; an enhanced situational awareness (ESA) capability derived from the ASIP architecture; a new high-band COMINT capability; enhanced 'special signals' provision; and the X-MIDAS signals-processing package. Scheduled to enter service circa 2010, the RC-12S' COMINT subsystem also forms the basis of the COMINT system planned for the service's Aerial Common Sensor Increment 1 platform.

Within the ANG, the Utah-based 169th Intelligence Squadron is equipped with three roll-on/roll-off 'Senior Scout' COMINT/ELINT shelters that can be carried by 'quick-change' C-130 Super E, H, HI and H2 transport aircraft. When carrying 'Senior Scout', such aircraft are fitted with clip-on antenna arrays (located on their main under-carriage and parachute doors, wingtips and tailcones) and as originally fielded 'Senior Scout' provided 2 kHz to 300 MHz band COMINT and 2-18 GHz band ELINT coverage. Elsewhere, the CBP is known to have operated a COMINT configured P-3A aircraft registered as 'N16370', which is known to have been used in a counter-narcotics role.

ATE SECURES VULTURE UAV EXPORT ORDER

By Helmoed-Römer Heitman

Jane's Defence Weekly, UK

www.jdw.janes.com

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South African aerospace company Advanced Technologies and Engineering (ATE) has won an export order for its Vulture tactical unmanned aerial vehicle (UAV) system, the company has said.

The order was confirmed at the end of May after a complete system was demonstrated in the undisclosed client's

country with the support of the South African Army. The system is currently en route back to South Africa. It is understood that a system ear-marked for the South African Army will be delivered to the export customer and later replaced by another system. ATE and the client are also understood to be discussing local manufacture of the Vulture system to meet future requirements.

The Vulture was developed for the South African Army's artillery as a target-acquisition and fire-direction system. It comprises a medium-sized UAV with a typical endurance of three hours at 60 km range, fitted with interchangeable day and night sensors. It is launched using a vacuum system and recovered using a net and soft pad. The entire system is normally trans-ported on three 10-ton trucks.

The UAV is controlled using a C-Band DSSS uplink and an encrypted narrow-band downlink specifically developed for it. «ATE regards this first export contract of the Vulture UAV system as a significant milestone in earning foreign revenue that would enable the development of more advanced UAV systems for our local client: the South African Army artillery,» Lorris Duncker, ATE's director of external affairs, told *Jane's* on 7 July.

«International contracts furthermore strengthen the initiatives within South Africa to consolidate UAV expertise and resources, so as to serve the local client more efficiently and compete more effectively against international rivals.»

AUSTRALIA CARRIES OUT SIX-WEEK TRIAL OF HERON UAV

By Julian Kerr

Jane's Defence Weekly, UK

www.jdw.janes.com

July 16, 2008

Australia's Border Protection Command (BPC) has held a six-week trial of the Heron 1 unmanned aerial vehicle (UAV) involving 80 hours of surveillance over Australia's northern coastline. The AUD5.5 million (USD5.2 million) trial was the first time that a large UAV has been placed on the Australian civil aircraft register and that a large UAV has flown under visual and instrument flight rules in non-controlled Australian airspace. Brendan Kosmer, capability development technical manager of Australian Customs, said that most of the eight operational flights lasted less than 10 hours, although one of about 15 hours was close to the aircraft's maximum endurance while carrying the full sensor suite.

RAYTHEON DEBUTS MULTIPLE UAV CONTROL SYSTEM

By Karen Walker

C⁴ISR, USA

www.c4isrjournal.com

July 17, 2008

The U.S. Navy's Tactical Control System (TCS) has been certified as the first unmanned ground control system that conforms to the NATO STANAG (standardization agreement) 4586 standard. NATO ratified the STANAG 4586 standard, enabling allied nations to share information from unmanned aircraft through a common ground control system.

The Raytheon-built TCS provides the Navy with a ground system that can control two dissimilar UAVs. The Navy's Northrop Grumman MQ-8B Fire Scout will be the first UAV to use STANAG 4586-conforming software.

«This is a significant first for the unmanned aircraft system technology community and the Navy,» said Mark Bigham, director of business development for Raytheon's Tactical Intelligence Systems unit, speaking at the air show this week.

«We are strong champions of this standardization effort.

«An open user interface enables the unmanned aircraft system operator, trained on one system, to control different types of UAV payloads with minimal additional training,» Bigham said.

Raytheon also used Farnborough to debut its Universal Control System (UCS) for operating and managing multiple UAVs of different types. Bigham said the UCS could save the U.S. Air Force \$500 million over 10 years. Those savings would be realized in three ways, he said.

First, because the UCS is based on commercial gaming technology, it is more intuitive and training could be cut by 30 percent, Bigham said. Second, a UCS would cut the number of UAV operators required by 25 percent. Third, the UCS could significantly reduce the number of UAV crashes caused by human operator error, the top cause of UAV incidents.

Bigham said the U.S. Navy, Air Force and Air National Guard, as well as the United Kingdom, had shown interest in the UCS. Raytheon is also developing a mobile version mounted on a Humvee known as the Transportable Raytheon Universal Control System. UCS could be fielded in about six months, Bigham said. «We could be operational next year.»

NASA RESEARCHERS EVALUATE SENSOR TECHNOLOGY

Space War, USA

www.spacewar.com

July 17, 2008

NASA researchers are evaluating an advanced, fiber optic-based sensing technology that could aid development of active control of wing shape. Controlling a wing's shape in flight would allow it to take advantage of aerodynamics and improve overall aircraft efficiency.

The Fiber Optic Wing Shape Sensor system measures and displays the shape of the aircraft's wings in flight. The system also has potential for improving aircraft safety when the technology is used to monitor the aircraft structure. Flight tests on NASA's Ikhana, a modified Predator B unmanned aircraft adapted for civilian research, are under way at NASA's Dryden Flight Research Center here. The effort represents one of the first comprehensive flight validations of fiber optic sensor technology.

«Generations of aircraft and spacecraft could benefit from work with the new sensors if the sensors perform in the sky as they have in the laboratory,» said Lance Richards, Dryden's Advanced Structures and Measurement Group lead. The weight reduction that fiber optic sensors would make possible could reduce operating costs and improve fuel efficiency. The development also opens up new opportunities and applications that would not be achievable with conventional technology. For example, the new sensors could enable adaptive wing-shape control.

«Active wing-shape control represents the gleam in the eye of every aerodynamicist,» Mr. Richards said. «If the shape of the wing can be changed in flight, then the efficiency and performance of the aircraft can be improved, from takeoff and landing to cruising and maneuvering.»

Six hair-like fibers located on the top surface of Ikhana's wings provide more than 2,000 strain measurements in real time. With a combined weight of less than two pounds, the fibers are so small that they have no significant effects on aerodynamics. The sensors eventually could be embedded within composite wings in future aircraft.

To validate the new sensors' accuracy, the research team is comparing results obtained with the fiber optic wing shape sensors against those of 16 traditional strain gauges co-located on the wing alongside the new sensors.

«The sensors on Ikhana are imperceptibly small because they're located on fibers approximately the diameter of a human hair,» Mr. Richards explained. «You can get the information you need from the thousands of sensors on a few fibers without the weight and complexity of conventional sensors. Strain gauges, for example, require three copper lead wires for every sensor.»

When using the fiber optic sensors, researchers do not require analytical models for determining strain and other measurements on the aircraft because data derived with the sensors include all of the actual measurements being sought. Another safety-related benefit of the lightweight fiber optic sensors is that thousands of sensors can be left on the aircraft during its lifetime, gathering data on structural health and performance. By knowing the stress levels at thousands of locations on the aircraft, designers can more optimally design structures and reduce weight while maintaining safety, Mr. Richards said. The net result could be a reduction in fuel costs and an increase in range.

Further, intelligent flight control software technology now being developed can incorporate structural monitoring data from the fiber optic sensors to compensate for stresses on the airframe, helping prevent situations that might otherwise result in a loss of flight control. By extension, the application of the technology to wind turbines could improve their performance by making their blades more efficient. «An improvement of only a few percent equals a huge economic benefit,» Mr. Richards said. «The sensors could also be used to look at the stress of structures, like bridges and dams, and possibilities extend to potential biomedical uses as well. The applications of this technology are mind-boggling.» NASA's Aeronautics Research Mission Directorate is supporting algorithm and systems development, instrument and ground test validation of the new sensor system.

PROX DYNAMICS' HORNET-1 PROTOTYPE MAKES FIRST FLIGHT

The world's smallest full authority helicopter made its first flight today at Prox Dynamics facilities in Asker, Norway. Hornet-1 is the first prototype of Prox Dynamics advanced Nano-UAS PD-100 Black Hornet.

**Asker, Norway
July 18, 2008**

Prox Dynamics AS, a Norwegian company established earlier this year, will make the world smallest unmanned UAS. A major milestone was reached today, as the Hornet-1 prototype lifted off for the first time. The flight lasted for more than 2 minutes, and was considered a major success. Take off, forward and turning flight and landings were demonstrated during the flight. The Hornet-1, weighing less than 15 grams with a rotor diameter of 100 mm, has the same dimensions and weight as the production version, but with a much simpler avionics package. Flight control is based on a standard radio system and specially designed servos developed in-house.

Pål Sandberg, Engineer and Testpilot in Prox Dynamics performed the flight, and commented afterwards; «It's surprisingly easy to fly». This is remarkable as most of the technology used in this aircraft have never been tested in a complete aircraft before. The rotor system, critical to its performance and maneuverability, is a completely new design comprising a two-bladed single rotor having some inherent stability. This is controlled by Prox Dynamics' own PDS-2 servos which are the smallest and lightest in the world, weighing less than 0.5 grams. The Hornet-1 will primarily be used to verify the concept of the rotor system mechanics, gather aero dynamical data and to some extent demonstrate the operational concept of Nano-UAS to potential users. For further information please visit our web site <http://www.proxdynamics.com>.

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GAME CONSOLES USED TO CONTROL DRONE FIGHTERS

System provides a more interactive experience for pilot operating aircraft

By Jane Wardell

Associated Press, USA

www.msnbc.msn.com

July 18, 2008

It looks like the ultimate new video game: the operator on the comfortable leather chair uses dextrous thumbs on a hand-held console to maneuver an aircraft, whose trajectory is shown on three large flat screens.

But the chair is for a qualified pilot and the landscape on the screen is downtown Baghdad - U.S. defense company Raytheon Inc. is providing a first glimpse of its new control system for unmanned aerial vehicles, or UAVs.

The company says its US\$500 million Universal Control System, which uses some hardware from the gaming world, will shorten training time and help prevent crashes of the expensive drones by providing a more interactive experience for the pilot.

«We wanted the human to get into a cockpit and feel they are stepping into the system,» said Mark Bigham, director of business development, at the Farnborough International Airshow outside London.

While older stations used just a keyboard, single screen and joystick, a key factor for Raytheon was making the system more intuitive, replacing key strokes with a game console, after talking with experts and discovering thumbs are the most energy efficient and accurate way to control a craft.

The leather chair is fully adaptable to individual users, who can also control a heating and cooling duct above their head at the touch of a switch.

And in a move away from what Bigham calls the «soda straw» view of most pilots of UAVs, the screens are augmented with digital images that provide a near 180-degree view;

Other data, such as the health of the craft and where troops are located, is provided on a fourth screen, in much the same way that video games provide extra on-screen information on character health and ammunition levels.

Raytheon, headquartered in Waltham, Massachusetts, is hoping to capitalize on the rapidly growing use of unmanned aerial vehicles in both military operations and civil environments around the world - the overall global market is set to go from US\$3.5 billion to some US\$55 billion in just 10 years, according to the Teal Group.

The war on terror has spurred the use of drones in combat areas, with unmanned aircraft currently flown by the U.S. Air Force and the Royal Air Force in both Iraq and Afghanistan.

BAE Systems PLC announced plans at Farnborough to work with Britain's Ministry of Defense to develop an unmanned aircraft, known as Mantis, that can drop laser-guided bombs and fire missiles.

But the increased use of the drones has highlighted problems with control systems - a Predator crash in Iraq in 2006 was attributed to error by its pilot back in Nevada. Two more recent Predator crashes by the RAF and U.S. Air Force earlier this year have initially been blamed on mechanical problems, but the full reports on the incidents have not yet been published.

The Predators, which are built by General Atomics, are flown by pilots located on a base near Las Vegas. Primarily used for surveillance and reconnaissance, they can also be armed with missiles for hunter-killer missions.

The Federal Aviation Administration says that over two-thirds of Predator UAV crashes are due to human errors interacting with the flight controls. With Predators worth more than US\$20 million each, that makes for a costly mistake.

«A lot of things are being attributed to pilot error that should be attributed to poor design,» said Bigham, adding that Raytheon believes that its system could reduce costs for the U.S. Air Force by US\$500 million over 10 years.

That estimate is based on a combination of reducing the number of crashes and the time spent training pilots to use the system and cutting the number of pilots required to fly fleets of the aircraft.

It hopes at some point to develop the system further so the console, and potentially the chair, vibrates to reflect the sensation of conditions including turbulence and landing.

Raytheon, which has been building its system for the past three years at a cost of «several million» dollars, has been in discussions with both the U.S. Air Force and the Royal Air Force and has hosted several delegations who have shown an interest at Farnborough, including the Saudi International Guard.

For now, Raytheon is focused on military applications. But the system can also be used for marine and civilian applications. In the United States, Customs and Border Protection is already operating four Predator B drones over the Mexican border, watching for drug traffickers and illegal immigrants.

«People say I'm crazy, but one day we'll see unmanned automobiles,» said Bigham. «That's the next big area.»

NAVY LOOKS TO BOOST SNOOP POWER

By Rajat Pandit

The Times of India, India

<http://timesofindia.indiatimes.com>

July 20, 2008

With the Navy keen to bolster its maritime snooping capabilities to keep tabs on the ever-increasing military activity in Indian Ocean Region (IOR), the government has now floated a global tender for procuring six to eight spanking new

medium-range maritime reconnaissance (MRMR) aircraft.

The hunt for MRMR planes, each of which should cost around Rs 270-300 crore, comes even as India is on course to sign around Rs 8,000 crore deal for eight Boeing P-8i Poseidon LRMR (long-range maritime reconnaissance) aircraft, which when inked will be the single biggest defence deal with the US.

The RFP (request for proposal) for the MRMR aircraft was issued on July 11 to several companies, which include Italian Alenia Aeronautica's ATR-72-500MP aircraft, Brazilian Embraer's P-22, French Dassault's Falcon 900DX and Russian Antonov-72P, among others. «The contract should be inked by mid-2009, with deliveries slated to begin from 2012-2013 onwards. The first lot will be of six aircraft, which will be followed by at least two more,» said an officer.

The LRMR and MRMR planes, also equipped with potent anti-submarine warfare (ASW) capabilities, form part of Navy's plan for an effective three-tier aerial surveillance grid in IOR.

For the innermost layer surveillance up to 200 nautical miles, Navy is also going in for two more UAVs (unmanned aerial vehicles) for Rs 300 crore after successfully exploiting eight Israeli Searcher II and four Heron spy drones.

«Moreover, the Indo-Israeli project for developing rotary-wing UAVs, which will be deployed from warships, is progressing steadily. The eventual plan, of course, is to back all this up with overarching space-based reconnaissance systems,» the officer said.

Incidentally, the Coast Guard, too, is looking to induct six multi-mission maritime aircraft on the lines of the naval MRMR planes but without ASW capabilities in the shape of missiles and torpedoes. India, after all, has a 7,516-km coastline, 1,197 islands and a 2.01 million sqkm Exclusive Economic Zone (EEZ), which will expand to about 2.54 million sqkm after delineation of the Continental Shelf in a couple of years.

«Our huge maritime interests, which also include 13 major and 185 minor ports as well as offshore assets, face threats from hostile state and non-state actors. IOR, which is part of our strategic area of interest, itself spans around 74 million sqkm,» the officer said.

The MRMR aircraft, with a range of over 400 nautical miles, will basically be for patrolling the country's huge EEZ, along with the existing Dornier-228 fleet. As reported earlier, eight of the 11 new Dornier-228s, ordered for Rs 726 crore, have already been inducted by the force.

The LRMR planes, in turn, are slated to replace the eight ageing and fuel-guzzling Tupolev-142Ms, which after overhauling will be operated till around 2012.

The Navy hopes to get the eight new aircraft between 2012 and 2015. In this category of long-range patrolling, of course, are also the Navy's five Russian IL-38s, now armed with the «Sea Dragon mission suites».

PREYING FOR SUCCESS

BAE Systems Mantis UAV demonstrator could provide key to large platform entry

By Douglas Barrie

Aviation Week & Space Technology, USA

www.aviationweek.com/awst

July 21, 2008

Britain's Mantis long-endurance ISR (Intelligence, Surveillance and Reconnaissance) and strike UAV program will provide BAE Systems with a candidate platform to address upcoming U.S. requirements, and not only U.K. national needs.

Mantis was unveiled on the opening day of the Farnborough air show, and is a key element of company work in the sector. BAE Systems and the Defense Ministry have been keeping Mantis related work under wraps for the past 18 months, although limited details began to emerge recently.

Mantis could provide the Defense Ministry with an alternative to further significant purchases of the General Atomics Predator B/Reaper UAV. London has so far ordered three under an urgent operational requirement, with the potential for considerably more.

The compressed development schedule for Mantis also offers the promise of availability in a time frame not much beyond that of additional Predator B UAW

Fabrication work on the airframe, which has a wingspan on the order of 70 ft., is already underway. Ground runs are



BAE Systems Mantis long-endurance UAV is intended to provide the RAF with a persistent surveillance and attack capability.

anticipated before the end of this year, with a first flight scheduled for early 2009. Endurance for an operational variant of the Mantis would be around 30 hours, with the UAV operating at altitudes of 25,000-50,000 ft. says Mark Kane, BAE Systems managing director for autonomous systems.

The company considered single and twin-engine designs for the Mantis re-quirement, before settling on the upper-fuselage stub-pylon twin engine configuration. This provides several advantages; one is the ability to loiter for long periods on only one of the two engines, while also offering greater assurance for eventually clearing the UAV for operation in non-segregated air space. The engine for the prototype is a variant of the Rolls-Royce Model 250. The intended powerplant for a production standard Mantis is yet to be determined. «It (the Model 250) is not going to be the final choice,» says Kane, «we're assessing a range of engines.» The final choice could also be based on ongoing Rolls-Royce development work.

Performance and dimension data for the Mantis has not yet been made public, but the intent is for a maximum cruise speed of 200-300 kt. Along with a pusher-prop approach, BAE Systems has also carried out limited concept work on a turbofan derivative of the basic design.

The Mantis advanced concept technology demonstrator is intended to address Defense Ministry requirements for persistent intelligence, surveillance, and reconnaissance, and for a long-endurance strike capability.

The Mantis mock-up displayed had a total of six under-wing hardpoints, while wind-tunnel test items showed an eight pylon configuration. The forward fuselage hump would house a satellite communications antenna. The Mantis program is being run by the ministry's Strategic UAV Experiment integrated project team (Suave).

Kane says Spiral 1 of the Mantis program will cover integration of the image collection and sensor management system, along with «some sensors.» Spiral 1 will likely see the demonstrator fitted with an electro-optical (EO) payload. The Mantis is intended to eventually carry EO and infrared sensor payloads, as well as synthetic aperture radar. Spiral 2, which has yet to be formally ap-proved, would include the integration of air-to-surface weapons.

Air Marshal Simon Bollom, the Defense Ministry's director general combat air, says «Mantis is a platform with which we can experiment!»

The ministry may also use the Mantis demonstrator as part of its Project Morrigan work, examining the utility of UAVs, including in operational theaters. BAE Systems' Herti tactical UAV was deployed to Kandahar AB in Afghanistan as part of Project Morrigan. Kane says that the Mantis project is a good example of the intent and aims outlined in the ministry's Defense Industrial Strategy and the accompanying Defense Technology Strategy.

Mantis could also provide a complement to a low-observable unmanned combat air vehicle as part of the ministry's Deep and Persistent Offensive Capability force mix, either as an ISR element of a hunter-killer package, or as an armed loitering platform. The Suave IPT is also managing the BAE Systems-led Taranis low observable UCAV demonstrator.

Mantis could also provide a core platform element of the ministry's Dabinett ISR architecture program, worth a total of nearly \$2 billion. One element of Dabinett is a persistent ISR capability. Elements of Dabinett could be significantly revised around the turn of this year. This, however, is unlikely to affect the need for persistent ISR.

BRAVE NEW WORLD

Launch of Team Complex Weapons poses challenges for U.K., problems for the U.S.

By Douglas Barrie and Amy Butler
Aviation Week & Space Technology, USA
www.aviationweek.com/awst

July 21, 2008

Britain is finally moving ahead with the first phase of a fun-damental restructuring of its guided-weapons sector, but U.S. companies remain sidelined despite two years of fruitless talks.

The U.K. 's Team Complex Weapons (Team CW) effort received the formal go-ahead from Ann Taylor, the minister for defense equipment and support, at the Farnborough air show, 24 months after the initiative was unveiled by her predecessor Paul Drayson. He was the archi-tect of the ministry's Defense Industrial Strategy and wanted to launch Team CW around the beginning of 2007.

The Team CW program is of critical importance to the U.K.'s missile sector, and lead company MBDA U.K. Its success or failure has far-reaching ramifications for Britain's guided weapons industry.

Drayson had expected to announce Raytheon Systems Ltd. as a Team CW member when he flagged the initiative in 2006, alongside MBDA, Thales, Qinetiq and propulsion manufacturer Roxel. A tense meeting with Raytheon CEO Bill Swanson made it clear that the U.S. manufacturer felt unable to commit, given what it perceived to be clear U.S. anti-trust issues. Even in the U.K., getting a public policy exclusion act took far longer than anticipated.

Two years have elapsed, and the Defense Ministry, Team CW and Raytheon have continued to talk, but appear to have made little progress.

Rear Adm. Amjad Hussain, minstry's director of weapons, says: «The door is open; Team CW is not a closed shop.» «We haven't been shut out,» says Harry Schulte, Raytheon missile systems vice president. «If we are not in, I think that is problematic for us.» He adds the talks are continuing.

An initial one-year assessment phase for Team CW is being funded, covering six strands of weapons development. If what Steve Wadey, MBDA U.K. 's managing director, and the industrial chairman of Team CW, describes as challenging milestones are met, funding for a further two years of assessment work will be provided. The first year is worth £74 million (\$148.2 million), with the overall assessment phase valued at £250 million.

The six projects are: the Fire Shadow loitering munition, the Future Air-to-Surface Guided Weapon (FASGW) Heavy and Light, a family of 100-lb. weapons for the first element of the Royal Air Force's Selected Precision Effects at Range (Spear) requirement, the Common Anti-Air Modular Missile, and a capability enhancement program for the Storm Shadow cruise missile.

The programs selected reflect one of the underlying principles initially pushed by MBDA in its discussions with the Defense Ministry over restructuring of the sector - the development of families of weapons to cut down on the inventory of types in frontline service. The U.K. presently fields 27 types of guided weapons. Wadey suggests this could be reduced to between 8 and 14, to save both development and through-life support costs.

Hussain says: «We are concentrating on families of weapons rather than bespoke [custom] requirements: He adds that there is also interest in adopting «slower production» that provides the opportunity for «technology insertion.»

The project list also hints at one area which is «problematic» for Raytheon, and other U.S. missile manufacturers, unless the impasse over membership can be resolved. When first drafted, it was widely expected that the Raytheon IV dual-mode guided bomb would be a strong candidate for the so-called Spear Drop 1 requirement, with the air force's preference for an off the-shelf acquisition. A reduced yield version of the weapon, the Paveway IVR, was also considered for introduction into service from around 2013-14. The basic Paveway IV weighs 500 lb.

Experience from operations in Iraq and Afghanistan is highlighting the need for even further reduced-yield weapons. This is apparent in the development of the Spear Drop 1 requirement. The weapon's explosive fill could be as little as 10-16 lb., given the submetric accuracy predicted for this class of weapon. Spear Drop 1 is also being considered for the U.K.'s attack helicopter fleet, presently armed with Lockheed Martin's Hellfire missile.

Two programs identified in the assessment phase reflect efforts to boost Anglo-French collaboration in the guided-weapons sector. The FASGW(Heavy) program will also meet a French anti-ship missile requirement, while the Storm Shadow upgrades will also be included in the French version of the missile, known as Scalp.

The proposed guidance system for FASGW(H) has shifted from a radar to an imaging infrared seeker to provide a man-in-the-loop capability, and to accommodate possible rules of engagement limitations on fire-and-forget weapons. The configuration is provisional, with cost and capability trade-offs yet to be made. The FASGW(Light) requirement is to be met by Thales Lightweight Modular Missile design.

BROAD-SPECTRUM WAR

New SAMs, ballistic missiles and long-range UAVs eyed by China

By David A. Fulghum and Douglas Barrie

Aviation Week & Space Technology, USA

www.aviationweek.com/awst

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Faced with strong neighbors and regional competitors, China is attempting to build a military that is agile, capable of technological surprises and strong enough to force a political end to hostilities before a foe can claim a military victory. To make the concept work, China must mount a defense sturdy enough to limit the damage from enemy attacks. Part of the design strategy is to offer more targets - primarily high-priority air defense complexes - than an attacking force can manage. To that end, Chinese air defenses are broad-based with many types and large numbers of missiles, missile decoys and radar-emitter decoys. U.S. analysts describe it as a «target sponge.»

In support of the defensive concept, China is credited with developing indigenous families of advanced missiles.

«Over the last decade, the Chinese have done a really good job on surface-to-air defenses,» says one U.S. intelligence analyst. «We thought the indigenous HQ-9 [SAM] was going to be just a copy of [the Russian designed, 50-naut.-mi. range] SA-10 (S-300),» he notes. «In the last year, it has become more of an SA-20 [S-300 PMU-2] with 108-naut.-mi. range and 98,500-ft. altitude and will become something even beyond that, like the SA-21 [S-400 with 250-naut.-mi. range].»

For perspective, if an SA-20 were placed in Washington, it could cover the area between Richmond, Va., and Philadelphia. An SA-21's ring would stretch from Charlotte, N.C., to Buffalo, NY. The ship-launched SA-N-20 has a range of 81 naut. mi.

The SA-21 long-range, strategic SAM isn't fully operational yet even in the Russian military, but much of the technology is expected to migrate to or be developed indigenously by the Chinese. «The SA-20 PMU-2 is scary enough,» a U.S. analyst says. «They have a legitimate air defense threat. They're also looking at a lot of low-observable [technologies for aircraft] and counter-stealth capabilities by operating radars over a wide spectrum of frequencies and developing multi-static [widely separated transmitters and receivers] layouts. They want a local air defense system that extends outward of the first island chain [that includes Taiwan].» Tactical ballistic missiles, cruise missiles, precision-guided weapons and unmanned aircraft also have attracted Chinese development efforts. The inventory, say U.S. sources, includes: 1,000 CSS 6/7 short-range ballistic missiles; 50-250 DH-10 Tomahawk.

DARPA VADER

By Patricia J. Parmalee

Aviation Week & Space Technology, USA

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A podded radar designed to allow the U.S. Army's General Atomics Sky Warrior unmanned aircraft to track vehicles and people has been flown by Northrop Grumman under the Defense Advanced Research Projects Agency's Vehicle and Dismount Exploitation Radar (Vader) program. Flown on a Britten-Norman Islander testbed, the sensor collected synthetic-aperture radar and ground moving-target indication data that were processed on a ground station to show vehicle motion. The Vader program was launched in 2006 to fly the Hellfire missile-sized radar pod within two years.

DETERRENCE SHIFT**The U.S. transitions to smaller, faster-moving, harder-hitting forces**

By David A. Fulghum

Aviation Week & Space Technology, USA

www.aviationweek.com/awst

July 21, 2008

The combat potential of the U.S. and its major partners in the Pacific is growing with an emphasis on range, networking, striking power and advanced intelligence gathering. But the pace of melding those pieces into a functional defense is affected by operational, manpower and financial demands of more traditional wars staged a half-world away.

Building an international coalition in the Pacific is a «marathon effort involving the nurturing of many relationships, most of them bilateral [since there is no multinational, defense organization in place],» says Gen. Howie Chandler, new commander of Pacific Air Forces (Pacaf).

Past commanders have focused on potential threats from North Korea, China and possibly Russia, which is experiencing a surge in nationalism. Even if conflict isn't imminent, planners worry about capabilities and how those countries' arms could find their way into the hands of non-state, radical extremists.

A new wild card for Pacaf planning is the unexpected shuffling of the service's top leadership by Defense Secretary Robert Gates-Air Force Chief of Staff Gen. T. Michael Moseley and Air Force Secretary Michael Wynne were summarily sacked. Both had pushed hard for more F-22s and C-17s-important factors in the Pacific-and in so doing gained the enmity of Gates and Deputy Defense Secretary Gordon England for straying from the President's budget and focusing on «Next War-itis» instead of increasing airborne capabilities in Iraq and Afghanistan.

«I don't see a shift in emphasis away from the Pacific, but it is a fact that the hot wars are in Southwest Asia,» Chandler says. Obviously, political attention and resources are primarily focused there, he notes.

The results of the seismic command shifts will play out over time, but so far forces in the Pacific and East Asia continue being shuffled and upgraded. Chandler points to the moves of active, electronically scanned array (AESA)-radar-equipped F-15Cs to Okinawa, all-weather Block 40 F-16s to South Korea and newer-model C-130s to Japan (along with the introduction of automated cargo handling) and Alaska. The only two C-17 squadrons based overseas are in the Pacific. Additionally, two new squadrons of F-22s are stationed in Alaska and a third will soon be operated from Hawaii as the first Raptor squadron commanded by the Air National Guard.

«I think [identifying an Air Force focus on rapid deployment] is exactly right,» Chandler says. «We and the other services have postured to do exactly that. Like the [airborne] AESA radar, we want our best technology forward. We don't know at what point that decision [about upgrading F-15Es or more F-15Cs with long-range, small-target AESA radars] will be made. That's a pretty big investment. But if you look at the F-22 [which also carries an AESA radar], three of the seven programmed squadrons are coming to the Pacific.»

Other interoperable purchases by regional allies include Singapore's F-15SG (with AESA radar), South Korea's F-15K (AESA-capable), Australia's F/A-18Fs (with AESA) and Taiwan's drawn-out bid to supplement their older F-16s with new AESA-equipped Block 50 or higher aircraft.

«[AESA radar] is a great capability whether on a fighter or whether we go back and look at [a more powerful, larger array on an upgraded] Joint Stars,» Chandler says. «We liked the technology, but it became a matter of affordability. The ability to, no-kidding, see and target with [improved] granularity would be important» in a Pacific-oriented, cruise missile defense scenario.

While Pacaf officials won't discuss cruise missile defense concepts of operations, it's known that Raytheon has developed Aim-120C-6, C-7 and D-model derivatives that can specifically seek out the small radar cross-section cruise missiles and engage them in head-on attacks.

Japan also is looking for a follow-on fighter. U.S. Air Force officials have been recommending the F-35 (designed for export with an AESA radar for small target detection and advanced elec-tronic surveillance) instead of the F-22, which would cost an extra \$1 billion to dumb-down for foreign sales.

«Their interest in what we're doing in terms of [cruise and ballistic] missile defense is something that will continue to develop as we put together the bilateral air operations center at Yokota AB [near Tokyo],» Chandler says. «The [missile

defense] testing they've done with the U.S. Navy has been quite successful. They will continue to be an integral part of a defense relationship. Aircraft purchases are going to be part of that.»

The selection of the Northrop Grumman KC-45 tanker reflects a U.S. predilection for long-haul deployments that can simultaneously lift the personnel, equipment and fighter aircraft needed for immediate, deployed operations. These decisions appear to reflect Australia's choice of long range over the convenience of aircraft like Boeing's 767, which offers access to more and smaller bases and higher-cycle, refueling mission cycle rates, according to Air Force analysts. Additional reinforcement of that long-deployment concept is being planned.

«The heart of an air force is range and payload,» Chandler says. «That plays out big time in the Pacific. Is [a new 2018] bomber doable? Yes. We've done a stealth bomber, but today we only have 20 left. We know how to integrate new weapons, and stealth technology has improved. So the natural progression would be [development of] a stealth aircraft with the range and payload to be able to penetrate and operate [within the coverage of advanced] integrated air defenses and other anti-access efforts. Another natural progression for the bomber is from manned to unmanned operations. That could be an excellent weapons system [manned or unmanned, strike or reconnaissance versions] to go with the advanced ISR we're putting into Guam.»

Construction of facilities to hold at least one squadron of four Global Hawk strategic-range, unmanned reconnaissance aircraft is progressing rapidly in Guam. That capability will complement the Navy's selection of Global Hawk for its broad-area maritime surveillance program.

«What we haven't had [stationed] in this theater is Predator and Reaper,» Chandler says. «It's something that has been absent that would be particularly useful in how we prosecute some of our plans. Operations in the Philippines and the Korean peninsula are exactly the scenarios I would look at. The Reaper with an F-16-like payload is something we think would be optimal for Korea.»

Networking in the Pacific among U.S. allies and partners may be necessary, but it won't necessarily be easy given the residual distrust of Japan left over from World War II, planners contend.

«When you start talking about a lot of bilateral relationships, data sharing becomes a big deal,» Chandler says. «That's why we sat down with representatives of 11 other nations and pulled off a fairly successful meeting centered on high-altitude, long-endurance UASs. We brought them here and then to Beale [AFB, Calif.] to show them some of the capabilities and our concepts of operations. The idea was not to sell them the Global Hawk, but to give them an idea of how we could work together in an area that is ripe [with eventualities such as] dealing with natural disasters, piracy, protecting economic zones or military contingency operations.»

Despite Gates's warning about an over-emphasis on «next War-itis,» Pacaf is obligated to study threats to the region. However, analysts here say they're going to gather and interpret information a bit differently and pay much more attention to what specialists from the regions they are interested in have to say.

«I'm less worried about [China's] capability than intent,» says Brig. Gen. (select), Martin Neubauer, Pacaf's director of intelligence. «Determining intent is the hardest thing to do. I think much of what we want to know is in open sources. There's a mountain of material, but it's in Chinese. You need the time and patience to read it-and translators. We don't have enough of them.»

Therefore, one of the intelligence initiatives for Pacaf is to start studying open documentation and doctrines of the countries of interest. Part of the vision is an Air Force center for open sources in Hawaii where Chinese linguists are part of the society.

«There's already Pacific Command's Asian-Pacific Center for Strategic Studies,» Neubauer says. «I think if we could hire a half-dozen people to get it going, the [intelligence] take would be huge in understanding intent and doctrine.»

Even where there are large numbers of qualified Chinese speakers, it requires a special knack to become a military analyst.

«It takes an absolute minimum of three years to generate an airborne Chinese linguist, and that's under perfect circumstances,» Neubauer says. «Typically it takes even longer. This is one of the longest training pipelines in the Defense Dept. Pulling native speakers off the street - as we did a number of years ago - didn't work [well]. We found that analytic skills are more important than linguistics, and that there's no correlation between being a native speaker and being really good in the combat linguist environment.»

But their experiments have produced some interesting insights. «We discovered that the ability to learn a language very quickly in a high-pressure environment-like the Defense Language Institute-correlates well with the analytical skills and mental processing speeds needed to put the pieces of a [tactical military] puzzle together,» he says.

DEVILRAY IN THE DETAILS
By Patricia J. Parmalee
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
July 21, 2008

A flying-wing unmanned air vehicle stable enough to catch a high-voltage power line on the fly, recharge its batteries and continue its mission is being developed by Dayton, Ohio-based Defense Research Associates (DRA) under a contract from the U.S. Air Force Research Laboratory.

The DevilRay UAV uses inverse capped-helix winglets to reduce drag and increase lift while also stabilizing the flying wing in

pitch and yaw without the need for airfoil reflex or a tail, says DRA. The hand-launched, 6-lb. UAV, which has a 48-in. span, has been flown manually, with autonomous power-line captures planned in about a year. The UAV would find the power line using a magnetometer, clamp on to the high-voltage wire and top up its batteries via inductive charging.

FINDING THE BOTTLENECKS

Asia-Pacific theater beefs up surveillance and wrestles with data overload

By David A. Fulghum

Aviation Week & Space Technology, USA

www.aviationweek.com/awst

July 21, 2008

Introduction of Global Hawk, wringing out of an advanced operations center, and facing the reality of threats to the military's fragile, long-haul communications are all integral to U.S. Pacific Air Forces' intelligence portfolio. Attempts to strangle the Air Force's communications here could come from anywhere. Both Global Hawk and the advanced operations center (AOC) could help the command avoid chaos by quickly opening new paths for intelligence collection, targeting, command and control.

«We have known for a long time about the vulnerability of our communications,» says Brig. Gen. (select) Martin Neubauer, director of intelligence for Pacific Air Forces headquarters, a veteran of Rivet Joint signals intelligence airborne operations who later commanded the U-2 ground station at Beale AFB, Calif. «Everybody realizes it's our Achilles' heel and that the more net-centric, automated and information-dependent we are, the more vulnerable we are to exploitation or disruption.»

Commercial communications satellites that the military often depend on are considered extremely soft targets for attack. Even some very arcane but important capabilities could disappear. Without satellite communications, for example, the EC-130 Compass Call electronic attack aircraft wouldn't have access to all the jamming programs that are available.

But to prepare for Global Hawk and other advanced intelligence, surveillance and reconnaissance (ISR) capabilities, «I have to calculate to what extent comms will be my limiting factor,» Neubauer says. «At some point you're going to have to push a lot of data through some kind of pipe. You have to sit down and map it out and that's what we've been doing with the imminent arrival of Global Hawk. We're looking at the architecture to figure out where the holes are in communications satellite coverage. To what extent is the military constellation booked up? Will we have to buy [additional] commercial time to make this work?» There's also technological missionary work to be done in the international arena.

Planners here «believe that with the right partnerships and alliances, a [high-altitude, unmanned aircraft] constellation with a great deal of persistence could be positioned anywhere in the theater if there are sites to land or control the aircraft,» says Gen. Howie Chandler, Pacific Air Forces commander. The U.S. concept of operations is to be able to launch and recover Global Hawk at Guam, but to actually control the system from the air operations center at Hickam AFB, Hawaii.

«We wanted to show [our partners and allies] our concept of operations and let them look at where they might fit into this constellation,» Chandler says. «Some of the nations involved will have the funds to do this. But it's not all about owning an airplane. It [may also consist of] providing basing, allowing refueling stops, controlling the system or processing all the data [up to 3,800 images a day] that you get from [Global Hawk] to turn it into actionable intelligence.»

For the moment, Pacific Air Force intelligence specialists are working through the new reality of the linkage of the five Distributed Communications Ground Stations around the world. The DCGS is the downlink and analytical center for much of what the big UAW, U-2s and other ISR platforms will collect. Now, instead of worrying about how to parcel out aircraft, planners have to regulate the flow of data to the DCGSs to ensure smooth processing, exploitation and dissemination with those limited resources.

«We're having to rethink who gets what,» Neubauer agrees. «I spend a lot of time worrying about bandwidth and comms paths because with Global Hawk, I've got to move data back and forth in the theater - right now. You've got to have a wide-band link to use the system. That's what keeps me up at night. Where do I bring the data down? Do I have physical security at that point? Taking out a critical [ground] antenna with an AK-47 could be as effective as taking out a satellite with a missile.»

The DCGS constellation also is seen as the mechanism to enforce discipline on the ISR complex and ensure focus on the highest priorities. «Otherwise our attention may be too narrowly focused and you miss something important because you're looking the wrong way,» Neubauer says. «Because the Air Force [has a new intelligence structure] has separated the war-fighting functions of major commands from the meta-architectures of how you move information and where it should go, I now have the time to do that. It allows me to eliminate distractions. I think [rationalized ISR] can best be done here rather than in Washington.»

Hawaii's other ISR analyses and fusion resources include a Joint Intelligence Operations Center (JIOC) with communications centralized into a regional service center. There the labor is divided between what the USAF brings to the fight and what the JIOC does best. The Air Force processes tactical, operational-level, Air Force-derived imagery. The JIOC can provide national imagery processed by the National Geospatial -Intelligence Agency. Since there is a lot to be gained by physical collocation, the two organizations are in discussion about processing all the imagery in the Pacific theater at one place.

That way, «a UAV driver can look at a nationally derived picture and understand how to better focus his sensor,» Neubauer says. «No one has done that so far. We're one of the few places where all the components needed for that type

of collaboration are within a 5-mi. radius. We're also working very closely with the Army and Navy as they get into DCGS, to figure out how to put the pieces together. For example, I now have an Army imagery exploiter sitting with the Air Force exploiters who are working Army targets in CentCom.»

The air operations center at Hickam AFB also is looking at an expanded operational horizon. «Future mission areas we're focusing on include integrated air and missile defense, which will provide greater capabilities to the bilateral center at Yokota [AB near Tokyo], says Brig. Gen. (select) Scott West, commander of the 613th Air Operations Center at Hickam AFB.

Within that center, the capabilities of the PAC-3 air defense missile, Aegis ballistic missile defense ships, F-15Cs with advanced small-target radars, early warning aircraft and aerial tankers can be optimized when pitted against cruise and ballistic missiles and new strike capabilities like the Su-30MKK. «The goal [of the Air Operations Center] is overcoming limited warning times from enemy attack and how best to posture or distribute command and control among the AOC elements and determining when and how best to use what we have,» West says. «We're always in a state of IT (information technology) adjustment in trying to keep a close eye all around the Pacific. There are some difficult decisions on how to posture our assets and how we can get additional contributions when needed.»

Hickam's Air Operations Center is in the midst of certification that would allow it to function as the operational home for a Joint Forces Air Component Commander. To achieve this, they have to demonstrate integration with other components and intelligence agencies, execute command and control across the theater, and adjust flow into the theater.

«The idea is to demonstrate operational level control and how we can take control of a campaign and put it together with the other services and then operate for days,» West says. The Air Operations Center will also lean on its relationship with a sister unit in Missouri's Air National Guard to assist in the execution of command and control. In addition to Hawaii, there are four full-size Centers in South Korea, mainland US., Germany and Qatar, along with a training facility at Hurlburt Field, Fla.

HALE AND HERTI
Aviation Week & Space Technology, USA
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The BAE Systems Herti has been demonstrated recently in an exercise involving the Gulf Cooperation Council states with the unmanned aerial vehicle being operated at a range of 800 km. (500 mi.) from the command center. The UAV was used for targeting and battle damage indication. The UAV can be operated at a range of up to 1,200 km, with an endurance of up to 4 hr.

HYBRID LIFTER
SkyHook hires Boeing to design and build heavy-lifter as interest in airships picks up
By Graham Warwick, with Amy Butler
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
July 21, 2008

Airships are an old idea that refuses to be grounded. The latest to refloat the concept is Boeing, which has teamed with a Canadian company to develop a commercial heavy-lift aircraft that is part airship, part helicopter.

Calgary, Alberta-based SkyHook International has hired Boeing's helicopter division in Philadelphia to design, build and certificate the JHL-40, a 302-ft.-long neutrally-buoyant airship with four Chinook rotor systems that will vertically lift a 40-ton payload and carry it 200 mi. without refueling.

Privately-held SkyHook plans to be Boeing's only customer, establishing an operating entity to provide heavy-lift services to the energy, forestry, mining and construction industries. The company sees a market for 50-60 aircraft. «We chose Boeing because market acceptance is an issue,» says Peter Jess, SkyHook President and CEO. «Without the Boeing name it would be impossible to bring an aircraft like this on stream.»

The heavy-lift airship and helicopter hybrid have both been tried before. Built for logging and flown in 1986, Piasecki's PA 97 Heli-Stat combined a 343-ft.-long aerostat and four Sikorsky H-34 helicopters. The Heli-Stat was brought down by ground resonance, but the computing tools now available to model the aircraft's complex dynamic responses can avoid the problem, says Ken Laubsch, Boeing's SkyHook program manager.

The Defense Advanced Research Projects Agency's (Darpa) Walrus program to demonstrate technology for a 500-ton-payload hybrid airship was killed by Congress in 2006, but contractors Aeros Worldwide and Lockheed Martin have not given up. Aeros has launched commercial development of a 210-ft.-long hybrid, the Aeroscraft ML866, aiming for certification in 2011.

Lockheed's Skunk Works continues to seek applications for its semi-buoyant Hybrid Unmanned Air Vehicle, including as a 50-ton-payload heavy-lifter and a persistent surveillance platform that could fly above an aircraft carrier battle group for days, or weeks, yet operate from water using its air-cushion landing gear.

Lockheed and Northrop Grumman are competing to build a stratospheric surveillance airship demonstrator under Darpa's Integrated Sensor Is Structure (ISIS) program. Carrying a 200-ft.-tall dual-band radar array, the full-scale solar-powered ISIS would stay aloft unattended for 10 years, providing air and ground surveillance. Interest in unmanned

airships for persistent surveillance is spreading. Security firm Blackwater has developed its own remotely-piloted airship, the Polar 400, and -BAE Systems plans to fly an airship by October. Designed with civil applications in mind, BAE's GA22 airship is being eyed for military use, including persistent surveillance, communications relay and targeting support. The heavy-lift market is more specialized. Boeing conducted a feasibility study for SkyHook in 2007, and earlier this year began work on the 59-month program to design the JHL-40, build two prototypes and obtain Canadian and US. certification in 2012. The program will proceed via a series of risk-reduction steps, each requiring more resources. The first step is configuration freeze in October, says Laubsch.

The JHL-40's semi-rigid helium-filled envelope supports the empty weight of the aircraft, making it neutrally-buoyant when no payload is attached. This and use of independently powered thrusters to maneuver the vehicle allows all rotor thrust to be used to lift payload. There is also a safety benefit in neutral buoyancy, says Laubsch. In the event of a power failure, the envelope can support the ve-hicle once its payload is dropped.

The initial A-model JHL-40 is aimed at the market to lift heavy equipment in the Canadian Arctic and Alaska, says Jess, avoiding the expense and environmental impact of building roads to remote areas. The crew of five will have onboard facilities for eating bathing and sleeping and these would sustain the crew in the event of an arctic ditching. Although Boeing plans to use commercial off-the-shelf components, including rotors, engines and thrusters, to keep down upfront costs, Laubsch says the JHL-40 will be an «expensive development program and an expensive aircraft.» But with global warming reducing the time during which the arctic tundra can support heavy vehicles, Sky-Hook sees a ready market in Canada's booming energy sector.

ALENIA WANTS ROLE IN UAV PLANS

Defense News, USA

www.defensenews.com

July 21, 2008

Alenia Aeronautica wants in on one of the new pan-European UAV efforts recently announced, CEO Giovanni Bertolone said July 16. «We want to be involved in one of the two plans,» said Bertolone, referring to two competing medium-altitude, long-endurance (MALE) UAV proposals, one offered by Thales and Dassault, the other by EADS. The latter is backed by France, Germany and Spain, which are funding risk reduction, while Thales and Dassault have made an unsolicited offer aimed at France and Spain. Bertolone said that a plan to work on a MALE UAV with Dassault and Saab, announced at last year's Paris Airshow, is still alive. Bertolone also announced that Alenia's Sky-X UAV has completed maneuvers with an Italian C-27J to simulate automated in-flight refueling.

BAE TESTS HELIUM AIRSHIP

Defense News, USA

www.defensenews.com

July 21, 2008

BAE Systems is giving a new twist to old technology with a plan to go into the airship-building business. The company intends to test fly a 22-meter-long airship designed by balloonist Per Lindstrom Known as the GA22, it is scheduled to fly for the first time later this year, probably in September. The vehicle, now just a technology demonstrator, could become a regular feature of the skyline, providing civil and military surveillance and communications-relay capabilities. The modern-day zeppelin would be autonomously controlled, using technology being developed by BAE for sophisticated UAVs, and use a nonexplosive gas. Richard Williams, BAE's director of research and technology delivery for unmanned air systems, said the 400-cubic-meter airship now under construction in Britain will carry a mission payload of about 150 kilo-grams and remain airborne 16 to 20 hours, depending on the weather.

BAE TO BUILD KNOWLEDGE WITH UAV

Defense News, USA

www.defensenews.com

July 21, 2008

BAE Systems has taken the wraps off a multimillion-pound technology demonstrator program aimed at boosting British know-how in unmanned autonomous systems. The doors had barely opened for business at the airshow here before BAE and the Ministry of Defence announced they had signed a deal to jointly fund the first phase of the Mantis development. The BAE-led consortium is scheduling the maiden flight of Mantis for early next year. Other companies involved include Rolls-Royce, QinetiQ, GE Aviation, Selex Galileo, Meggitt and L-3. Industry sources estimated the investment in the tens of millions of pounds, much less than the 124 million pounds (\$248 million) being jointly invested by industry and government in the stealthy, jet powered Taranis unmanned air vehicle technology demonstrator launched in 2006. Many of the leading players in Mantis are also playing a role in Taranis. A BAE spokesman said Mantis would have a 24-hour plus endurance, an operating ceiling of 50 kilometers and a wingspan approaching 22 meters. A mock-up of Mantis displayed by BAE at the airshow carried precision-guided bombs and Brimstone anti-armor missiles.

FLIGHT TEST FOR VADER
Defense News, USA
www.defensenews.com
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Northrop Grumman has flight-tested a new Vehicle and Dismount Exploitation Radar (VADER) system under a contract with the Pentagon's Defense Advanced Research Projects Agency, the company said. VADER is a radar sensor Northrop is developing for use with the Sky Warrior extended range multipurpose UAV under development by General Atomics. When deployed, VADER will allow Ground Moving Target Indicator (GMTI) data and Synthetic Aperture Radar (SAR) imagery to be instantly available to ground commanders. During this first test flight in Georgetown, Md., high-resolution SAR imagery and GMTI data were collected on a Northrop PBN Islander test aircraft and processed on a radar ground station to show vehicle motion on the ground.

PENTAGON PLANS \$1.3B FINDING SHIFT TO BUY ISR
By John T. Bennett
Defense News, USA
www.defensenews.com
 July 21, 2008

Senior Pentagon officials have asked Congress to greenlight shifting nearly \$1.3 billion in the 2008 budget to buy more intelligence-gathering systems and send them to deployed troops. The money would come mostly from Army procurement coffers, breaking with the past practice of raiding Air Force and Navy accounts to fund some war costs. The transfer answers a call made over the last few months by Defense Secretary Robert Gates.

The financial details are spelled out in a 17-page reprogramming request signed by Deputy Defense Secretary Gordon England. «These funds are being made available for ISR based on the view of the secretary of defense that the ISR effort is a higher priority, and need to be address[ed] at this time,» the document said.

The Pentagon has shifted previously appropriated funds from annual service budgets to cover emerging war costs numerous times during the Iraq and Afghanistan conflicts. But this request marks the first time senior Defense Department leaders have primarily drawn from Army procurement accounts to pay large war-related bills.

The largest portion of the money, \$930 million, would be taken from tactical wheeled vehicle and electronics programs accounts, according to a copy of the request obtained by *Defense News*.

One analyst said the proposed move is not entirely bad news for the ground service, because almost \$700 million of that amount would be shifted within its own procurement accounts. The move would allow the Army to «control the assets» purchased for overhead surveillance, while also «making it easier for the Army to reimburse those other accounts later,» said James McAleese, principal at McAleese & Associates, a government contracting and national security law firm.

If approved, \$686.9 million would be shifted within the Army - though away from future procurement programs - to pay for a host of intelligence, surveillance and reconnaissance platforms and related items, including:

- \$262.6 million to buy digital data links for Raven UAVs, data links and laser designators for Hunter unmanned aircraft, and various improvements for other unmanned aircraft.
- \$168.5 million to buy eight Medium Altitude Reconnaissance and Surveillance airborne systems, with \$52 million for three new Constant Hawk airborne surveillance and target acquisition systems.
- \$116 million to «procure ground SIGINT collection and analysis capabilities.»

A total of \$456 million would be stripped from Army vehicle accounts, including \$386 million from the Army's Family of Tactical Wheeled Vehicles (FMTV) and \$70 million from tactical trailers and dolly sets.

The FMTV program was «an easy target» for such a funding cut, McAleese said, because «there have been concerns within the service and certainly on Capitol Hill that the contractor could not execute the program - build trucks - as quickly as the money was being allocated.»

The trucks are built by BAE System's mobility and protection systems division.

Also up for a major funding cut would be several Army communications and electronics programs. Collectively, the SINCGARS, Bridge to Future Networks, Improved HF Family radio, and Force XXI Battle Command Brigade and Below programs, would lose \$479.9 million.

The Navy would get \$133 million to purchase the kinds of systems Gates wants to speed into theater, including \$17 million to extend a contract for Scan Eagle UAV services, \$15 million to buy a new Northrop Grumman Global Hawk UAV and associated gear and services, \$26 million to purchase four Boeing-made Scan Fogies and cover associated costs, and \$30 million to buy one Lockheed Martin-made EP-3 aircraft.

For the Air Force, congressional approval would bring \$197.9 million to buy intelligence systems like seven Hawker Beechcraft-manufactured C-12 aircraft, which, the document said, «supports the [secretary's] initiative to put more ISR capability in the war fighters' hands immediately.» Another \$61.6 million would go toward integrating new imaging and defensive systems on those C-12 planes. The remaining amount intended for the air service would buy other items, including training systems, software, sensor packages and other aircraft modifications.

The remaining funds that would be reprogrammed, \$331 million, would come from across the department. The Marine

Corps would lose \$112.2 million in O&M dollars earmarked for «physical security equipment,» while the Navy would be stripped of \$71 million intended for imagery systems, construction equipment and command support gear.

Should lawmakers sign on, \$98 million would be moved from Air Force plans for various kinds of vehicles, runway clearing equipment, electronic infrastructure components and base maintenance equipment, according to the document. The rest, \$50.1 million, would come from an Air Force-managed space research and development account.

The move would be a major victory for Gates, who has been working for months to push the Air Force and the other services to send more ISR UAVs to Iraq and Afghanistan. During a headline-grabbing April 21 speech at Maxwell Air Force Base, Ala., the defense secretary told Air University students that convincing the services to send more intel-collecting platforms to theater was «like pulling teeth» because those officials «were stuck in old ways of doing business.»

«While we've doubled [in-theater ISR] capability in recent months, it is still not good enough,» he said.

Douglas Macgregor, a retired Army colonel who is now a senior fellow at the Washington-based Center for Defense Information, said UAVs may be useful in defeating a «weak enemy» like the various anti-U.S. groups in Iraq. But such a significant investment in such assets, he said, could end up leaving U.S. forces ill-prepared to take on a peer military.

PRESS RELEASE

SDS Delivers Predator Simulator to the Netherlands SDS International Inc. July 21, 2008

SDS International (SDS) recently delivered a laptop-based, MQ-1 Predator simulator to the National Aerospace Laboratory (NLR), Amsterdam, Netherlands. The MQ-1 Predator version of SDS' low-cost, high fidelity PC-based Remotely Operated Vehicle Adaptable Tracking/Training System (ROVATTS[™]) simulator line will be used by NLR personnel in a Netherlands' DoD sponsored R&D program focused on Human Factors issues in the operation of Unmanned Aerial Vehicles (UAV) from a Ground Control Station, particularly regarding teamwork issues.

The ROVATTS Predator simulator, produced by SDS International's Advanced Technologies Division, Orlando, Florida, represents but one of the virtually unlimited types of air, ground, and sea-based Unmanned Vehicle Systems capable of being simulated by ROVATTS's highly adaptable architecture. One ROVATTS Predator simulator includes both pilot and sensor operator stations that incorporate a high fidelity MQ-1 aerodynamics package (including critical landing/turbulence/control-delay affects); DIS/HLA connectivity; various head-up-displays; functioning head-down-displays (including variable information tables and menu button interfaces); Electro-Optical/Infra-red sensor displays portrayed on high-fidelity terrain scenes provided by SDS' AACuity[®] PC-IG; map tracking displays, record/playback capabilities; and data-capture/analysis capabilities.

BOEING TO BUY INSITU, ITS SCANEAGLE UAV PARTNER

By Ben Iannotta

C4ISR, USA

www.c4isrjournal.com

July 22, 2008

Insitu, the 360-person company specializing in tactical UAVs, has agreed to be purchased by Boeing, a decision motivated in part by the U.S. Navy's search for a contractor to supply a fleet of tactical UAVs to be flown by sailors and Marines.

«They're looking for more than just a company that can build a UAV. There's logistical support, training and ground systems that are beyond the scope of what we can do. Boeing fills that need,» said Al Jackson, vice president of sales and government relations for Insitu, based in Bingen, Wash.

For Boeing, the acquisition is part of the company's strategy of «selectively vertically integrating» in the intelligence, surveillance and reconnaissance arena, said Vic Sweberg.

The Navy plans to release a request for proposals for the Small Tactical Unmanned Aircraft System/Tier 2 competition this fall. The Navy has told contractors it wants the winner to supply the UAVs, service them and train forces how to use them.

Boeing and Insitu have worked together since 2002 on a 40-pound, military UAV called ScanEagle, which carries infrared and visible-light cameras. The companies are flight testing a cloud-piercing synthetic aperture radar that they hope to add to the aircraft. Navy crews have launched ScanEagles from ships and Marines have used it to as an eye in the sky over battlefields. Those aircraft were provided under a leasing arrangement paid for out of a military operations and maintenance account.

The stakes are higher for the upcoming Navy purchase. Managers plan to purchase the aircraft and services under a budget line in the Pentagon spending plan, making it a formal «program of record» that could last for years.

Jackson said Insitu has no plans to leave its facility in Bingen, an area that he said is known as a hotbed of technical creativity.

«This agreement retains our ability to be entrepreneurial, innovative and agile,» Jackson said. «There's a uniqueness to this area. We've been able to take advantage of that. We're not going to change that.»

The acquisition must be cleared by U.S. regulators, which is expected to take 30 to 60 days.

METAL STORM DEVELOPING NON-LETHAL WEAPON SYSTEM

Gizmag, USA

www.gizmag.com

July 22, 2008

Better known for its highly lethal Stacked Projectile Electronic Ballistics Technology which enables one gun to fire a million rounds a minute, Metal Storm has received a contract from the United States Marine Corps Marine Systems Command to demonstrate capabilities for a Mission Payload Module - Non-Lethal Weapons System (MPM-NLWS) designed to provide the warfighter a non-lethal counter-personnel capability.

The system will support missions requiring crowd control, and will deny, defend and control area access while allowing the warfighter to engage threats at standoff ranges and protect non-combatants.

Metal Storm's ballistics system is quite unique in the armaments field, as the «rounds» are stacked in the multiple barrels one on top of the next. As rounds are individually addressed and initiated (fired) electronically, the weapon has no moving parts, meaning it can never jam and that its rate of fire is not limited by mechanical parts, allowing reliable long term unattended weapon operation.

This «stacked projectile» technology is quite similar in operation to the way an ink-jet printer works, using multiple barrels mounted together on one platform. As the barrels can be of various sizes, this allows varying munitions types to be deployed in a single, low cost, lightweight weapon system.

Metal Storm is working with a range of U.S. and Australian government agencies and departments, as well as industry, to develop a variety of systems utilising the Metal Storm non-mechanical, electronically fired stacked ammunition system.

Metal Storm's weapon technology uses computer-controlled electronic ignition and a system of stacked projectiles, to achieve a completely non-mechanical gun that is very lightweight and compact, providing a very high firepower to weight ratio.

The initial contract for the MPM-NLWS is valued at US\$103,751 and under the terms of the contract, Metal Storm will prepare and deliver a demonstration model for a Government-controlled Market Research Demonstration (MRD).

The MRD is intended to aid the Government in identifying current technologies that have been developed by industry. Following the MRD, the Government plans to initiate a new full-and-open contracting effort for a System Development and Demonstration (SDD) Phase contract. Following these phases, the government anticipates releasing proposals for production contracts.

Metal Storm's General Manager Peter D. Faulkner said «Metal Storm is pleased to be participating in the MPM program and are looking forward to the Market Research Demonstration. We believe the benefits of our technology when combined with that of our teaming partner Defense Technology, part of the BAE Systems Products Group, will provide significant improvements in range, area coverage and in particular, volume of fire over existing non-lethal weapon systems.»

The MPM-NLWS will be mounted onto the High Mobility Multipurpose Wheeled Vehicle (HMMWV). Follow-on spirals will ultimately be integrated on other tactical vehicle platforms, unmanned ground vehicles, and Navy surface water vessels through an evolutionary acquisition process. Effects such as obscuration and illumination will be added to address future and emerging capability gaps. The weapons platform will be capable of providing greater range, area coverage, precision, and scalability than current NLW systems.

PRESS RELEASE

Boeing Acquires Insitu to Expand Capabilities in Unmanned Systems

Boeing Integrated Defense Systems, USA

St. Louis, Missouri, USA

July 22, 2008

The Boeing Company today announced an agreement to acquire Insitu, Inc., a pioneer in the unmanned air systems (UAS) market and leader in the design, development and manufacture of high-performance, low-cost UAS used for intelligence, surveillance and reconnaissance (ISR). Boeing and Insitu have partnered since 2002 and together developed the successful ScanEagle™ UAS program, which has more than 100,000 operational flight hours with the U.S. Department of Defense and international customers. Insitu's key technologies and advanced capabilities in rapid prototyping and manufacturing are driving its revenue to an anticipated \$150 million this year, 70 percent higher than in 2007, and have it well positioned for the future.

«Increasingly our customers are seeking advanced unmanned aerial solutions to address a wide range of requirements for ISR missions,» said Jim Albaugh, president and CEO of Boeing Integrated Defense Systems. «The Boeing-Insitu team has been successfully delivering much-needed capability to the warfighter in a changing threat environment. Bringing these outstanding teams together will accelerate deployment of the next generation of unmanned systems to our U.S. and allied service members.»

Terms of the cash transaction were not disclosed. This transaction, anticipated to close by the end of September

following regulatory approvals, does not affect Boeing's financial guidance. Once acquired, Insitu will be a separate subsidiary under Boeing Integrated Defense Systems' Military Aircraft unit. It will retain an independent operating model while benefiting from Boeing's vast resources.

«This acquisition is part of a larger plan to aggressively grow our presence in the unmanned systems market,» said Chris Chadwick, president, Boeing Military Aircraft. «We look forward to building upon our existing relationship with Insitu to deliver industry-leading tactical unmanned systems and services to our customers.»

Founded in 1994 as an entrepreneurial start-up, Insitu, located in Bingen, Wash., designs, develops and manufactures UAS for commercial and military applications. It built the first UAS to cross the Atlantic Ocean, and today has approximately 360 employees.

«This agreement allows us to leverage the breadth and strength of Boeing to get our organization to the next level,» said Steven Sliwa, president and CEO of Insitu. «At the same time, it allows us to retain the unique culture and environment that have driven the continuous innovation and entrepreneurial agility that have us positioned as a leader in our market.»

PRESS RELEASE

Navy's Global Hawk Maritime Demonstration Unmanned Aircraft Supports Northern California Firefighters During Navy Exercises Northrop Grumman San Diego, California, USA July 22, 2008

The U.S. Navy's RQ-4 Block 10 Global Hawk Maritime Demonstration (GHMD) unmanned aircraft system demonstrated its flexibility and persistence by providing critically needed imagery to firefighters during the recent Northern California wildfires. Built by Northrop Grumman Corporation, GHMD flew more than 23 hours June 27-28 and collected more than 500 images for local fire officials. «The flexibility of the GHMD team to rapidly shift gears from a planned maritime mission to a domestic humanitarian mission surpassed many expectations, by responding so quickly and providing high resolution images for the firefighting commanders,» said Dave Seagle, GHMD program lead for the Persistent Maritime Unmanned Aircraft Systems Program Office (PMA-262) at Naval Air Station Patuxent River, Md. «GHMD's capabilities and versatility to support this mission may have ultimately helped save lives and homes, and that is extremely gratifying to our GHMD team.»

Flying its first civil emergency support mission for the U.S. Northern Command, GHMD imaged various fires, including those near Monterey, San Francisco Bay, Big Sur, Crescent City, and the California-Oregon border.

«The images were gathered while the GHMD aircraft was on assignment in Point Mugu, Calif., supporting the Navy's Trident Warrior and Rim of the Pacific 2008 exercises,» said George Guerra, Northrop Grumman vice president of high-altitude long-endurance systems. «The GHMD team has performed superbly, meeting all mission objectives in support of both exercises.»

The RQ-4 Block 10 GHMD can soar up to 65,000 feet, much higher than any other operational unmanned aircraft. It provides high-resolution, near real-time imagery and other sensor data for intelligence, reconnaissance and surveillance. The high-flying aerial vehicle's radar can persistently see through any type of weather. The newer RQ-4 Block 20 aircraft has demonstrated the ability to remain aloft for more than 35 hours.

The GHMD configuration uses a basic integrated sensor suite with an electro-optical, infrared, synthetic aperture radar payload modified for the maritime environment, along with limited signals intelligence capability. The GHMD aircraft is also equipped with a Naval Research Laboratory-designed automatic identification system, enabling it to receive shipboard broadcast system transponder information.

The principal Global Hawk team members include: Aurora Flight Sciences, Bridgeport, West Va. (V-tail assembly and other composite structures); L-3 Communications, Salt Lake City (communication system); Raytheon Space and Airborne Systems, El Segundo, Calif. (integrated sensor suite); Raytheon Intelligence and Information Systems, Falls Church, Va. (ground station); Rolls-Royce Corporation, Indianapolis (engine); and Vought Aircraft Industries, Dallas (wing).

MICRO AIR VEHICLE: THREE GRAM 'DRAGONFLY' TAKES FLIGHT

Science Daily, USA

www.sciencedaily.com

July 22, 2008

The DelFly Micro is a 'Micro Air Vehicle' (MAV), an exceptionally small remote-controlled aircraft with camera and image recognition software. The Micro, weighing just 3 grams and measuring 10 cm (wingtip to wingtip) is the considerably smaller successor to the successful DelFly I (2005) and DelFly II (2006).

Engineers have made a new tiny DelFly Micro air vehicle. This successor to the DelFly I and II weighs barely 3 grams, and with its flapping wings is very similar to a dragonfly. Ultra-small, remote-controlled micro aircraft with cameras, such as this DelFly, may well be used in the future for observation flights in difficult-to-reach or dangerous areas.

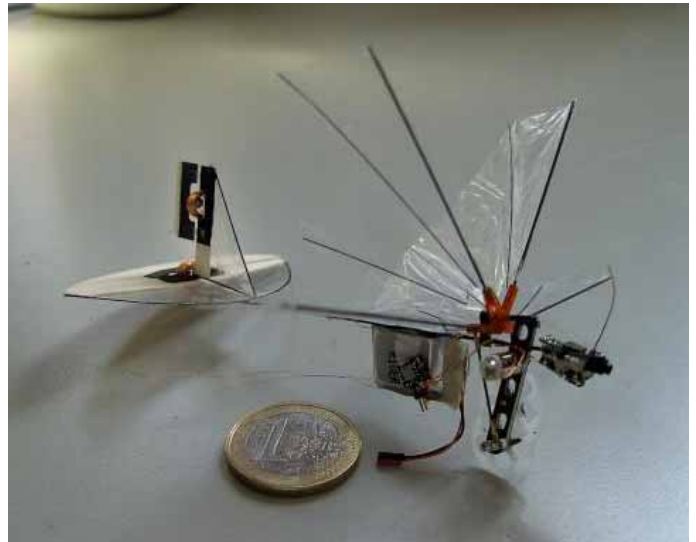
The DelFly Micro is a 'Micro Air Vehicle' (MAV), an exceptionally small remote-controlled aircraft with camera and image recognition software. The Micro, weighing just 3 grams and measuring 10 cm (wingtip to wingtip) is the considerably

smaller successor to the successful DelFly I (2005) and DelFly II (2006). The DelFly Micro, with its minuscule battery weighing just 1 gram, can fly for approximately three minutes and has a maximum speed of 5 m/s.

Ultra-small remote-controlled, camera-equipped aircraft are potentially of great interest because they could eventually be used for observation flights in difficult-to-reach or dangerous areas.

Principle Derived from Nature

The basic principle of the DelFly is derived from nature. The 'dragonfly' has a tiny camera (about 0.5 grams) on board that transmits its signals to a ground station. With software developed by TU Delft itself, objects can then be recognised independently. The camera transmits TV quality images, and therefore allows the DelFly II to be operated from the computer. It can be manoeuvred using a joystick as if the operator was actually in the cockpit of the aircraft. The aim is to be able to do this with the DelFly Micro too.



Miniaturisation

The development of the DelFly is above all the story of continuing miniaturisation of all the parts, from the DelFly I (23 grams and 50 cm) via the DelFly II (16 grams and 30 cm) to the present DelFly Micro (3 grams and 10 cm).

The DelFly II drew huge attention in 2006 because it could fly horizontally (21 km/hr) as well as hover, just like a hummingbird, and also fly backwards. The DelFly Micro, incidentally, cannot do this just yet.

In a few years time, the new objective of the project, the DelFly NaNo (5 cm, 1 gram) will have been developed. The Micro is an important intermediate step in this development process. A second objective for the future is for the DelFly to be able to fly entirely independently thanks to image recognition software.

GD GETS CONTRACT FOR LCS BOAT-LAUNCH ROBOT

By Philip Ewing
C⁴ISR, USA

www.c4isrjournal.com

July 23, 2008

The U.S. Navy's littoral combat ships, already designed to be the most automated surface ships ever, could get yet another unmanned system - a boat-launching robot.

The Office of Naval Research has issued a contract to defense giant General Dynamics to develop a robotic system for launching and recovering small craft from an LCS, which will rely on unmanned sub-systems, including a small submersible and a pilot-less boat, to look for mines and submarines, according to an announcement July 21.

In a company announcement, General Dynamics said it was a good choice to design the Common Launch and Recovery System, as it's called, because the company also designed the unmanned surface craft that LCS will use to hunt for submarines. A spokesman for ONR said he could not immediately provide the value of the contract, and a representative from General Dynamics did not return a phone call seeking further information. Also unclear is when the first prototypes will be available or specifically how the system will work. It is unclear whether the boat-launching gear will be fully automatic or if it will launch and retrieve craft under the control of a human operator.

ROBOTS DEVELOPED THAT DRIVE THEMSELVES UP THE WALL

BBC News, UK

<http://news.bbc.co.uk/>

July 23, 2008

Scientists in the US have developed robots that are capable of climbing walls. BBC News has reported a team in SRI's Mobile Robotics and Transducers Programme have used the same principles behind electrostatic charges to develop machines about the size of a remote-controlled car that can scale a range of surfaces including brick, wood, steel and glass. The robots have caterpillar tracks that have materials with electro-adhesive properties inside them. When a current is applied to the tracks, they are attracted to the wall in the same way that balloons stick to ceilings after being rubbed.

«What we've invented is a way to induce charges on the wall using a power supply located on the robot,» research engineer Harsha Prahlad told BBC World Service's Digital Planet programme. «The robot carries with it positive and negative charges, and when the walls sees these charges it automatically generates the opposite charge. The robot can then clamp onto those charges.» The technology is called compliant electroadhesion and allows the robots to

crawl up a wall at a speed of about one body length per second, using a very small amount of power. The robots are being touted for use by the military as reconnaissance, and also for service applications and as toys. The team is now working on a way to apply their technology to more insect robots by putting electro-adhesive pads on the robot feet.

RAYTHEON'S TCS IS FIRST NATO STANDARD UNMANNED GROUND CONTROL SYSTEM

Space War, USA

www.spacewar.com

July 24, 2008

Raytheon's Tactical Control System has been certified as the first NATO standard unmanned ground control system. An industry first, it is the only ground system conforming to the NATO STANAG (Standardization Agreement) 4586 standard for the U.S. Navy Tactical Control System (TCS).

NATO ratified the STANAG 4586 standard, enabling allied nations to share information from unmanned aircraft through a common ground control system. NATO-compliant aircraft are equipped to translate information into standard message formats, and information received from other compliant aircraft can be transferred into vehicle-specific formats for seamless interoperability.

«This is a significant first for the unmanned aircraft system technology community and the Navy,» said Mark Bigham, director of business development for Raytheon's Tactical Intelligence Systems unit. «For more than 40 years, Raytheon has been at the forefront of developing the latest unmanned ground systems for our customers, and we have incorporated that heritage into the TCS system.»

TCS provides the Navy with an advanced ground system that can control two dissimilar air vehicles. The Navy's MQ-8B Fire Scout by Northrop Grumman will be the first air vehicle to use this STANAG 4586-conforming software. The control system consists of mission planning, command and control, data processing and dissemination capabilities for operation of the full range of tactical unmanned aircraft systems.

«Proving an open user interface enables the unmanned aircraft system operator, trained on one system, to control different types of UAS payloads with minimal additional training,» Bigham said. «TCS also has a 'plug-and-play' capability that allows for seamless integration.»

GLOBAL HAWK MARITIME DEMO UNMANNED AIRCRAFT SUPPORTS FIREFIGHTERS

Space War, USA

www.spacewar.com

July 25, 2008

The U.S. Navy's RQ-4 Block 10 Global Hawk Maritime Demonstration (GHMD) unmanned aircraft system demonstrated its flexibility and persistence by providing critically needed imagery to firefighters during the recent Northern California wildfires. Built by Northrop Grumman, GHMD flew more than 23 hours June 27-28 and collected more than 500 images for local fire officials.

«The flexibility of the GHMD team to rapidly shift gears from a planned maritime mission to a domestic humanitarian mission surpassed many expectations, by responding so quickly and providing high resolution images for the firefighting commanders,» said Dave Seagle, GHMD program lead for the Persistent Maritime Unmanned Aircraft Systems Program Office (PMA-262) at Naval Air Station Patuxent River, Md.

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The principal Global Hawk team members include: Aurora Flight Sciences, Bridgeport, West Va. (V-tail assembly and other composite structures); L-3 Communications, Salt Lake City (communication system); Raytheon Space and Airborne Systems, El Segundo, Calif. (integrated sensor suite); Raytheon Intelligence and Information Systems, Falls Church, Va. (ground station); Rolls-Royce Corporation, Indianapolis (engine); and Vought Aircraft Industries, Dallas (wing).

FROM DOLPHINS TO DESTROYERS: THE SCANEAGLE UAV

Defense Industry Daily, USA

www.defenseindustrydaily.com

July 27, 2008

ScanEagle was originally developed by Washington State's Insitu, Inc. to track dolphins and tuna from fishing boats, in order to ensure that the fish you buy in supermarkets is «dolphin-safe». It turns out that the same characteristics needed by fishing boats (able to handle the salt-water environment, low infrastructure launch and recovery, small size, 20-hour long endurance, automated flight patterns) are equally important for naval operations from larger vessels, and for battlefield surveillance. A partnership with Boeing helped take ScanEagle to market in those fields, and the rest has been making history.

Boeing has had field representatives in theater for a few years now to support and operate the Boeing/Insitu ScanEagle UAV from ships and ashore, receiving high battlefield praise and a fairly regular stream of contracts from the USA and Australia. ScanEagle has been demonstrated or used from 15 different vessels of various classes, including the USNS Fred G. Stockham [T-AK 3017] supply ship, HSV-2 Swift fast catamaran, USS Whidbey Island [LSD 49], Carter Hall [LSD 50] and Oak Hill [LSD 51] amphibious landing ships, and USS Oscar Austin [DDG-79] Flight IIA Arleigh Burke Class AEGIS destroyers. ScanEagle is currently being readied for deployment aboard the Flight II AEGIS destroyer USS Mahan [DDG-72]., and a number of specialty adaptations from sniper locator, to bio-warfare agent detection are being tested.

This article covers recent developments with the ScanEagle UAV system, which is quickly evolving into a mainstay with the US Navy - and others as well. The latest news involves Boeing's acquisition of its partner Insitu.

Contracts and Key Events: 2008

Unless otherwise noted, contracts are issued by the Naval Air Systems Command in Patuxent River, MD.

July 22/08: Boeing buys its partner Insitu, which will operate as a wholly owned subsidiary of Boeing's Integrated Defense Systems' Military Aircraft division:

«Insitu's key technologies and advanced capabilities in rapid prototyping and manufacturing are driving its revenue to an anticipated \$150 million this year, 70 percent higher than in 2007, and have it well positioned for the future.... Terms of the cash transaction were not disclosed. This transaction, anticipated to close by the end of September following regulatory approvals, does not affect Boeing's financial guidance.»

Insitu, Inc. retained investment bankers Houlihan Lokey for the acquisition, and terms of the sale were not disclosed. Insitu's investors are led by Battery Ventures, Second Avenue Partners, and Pteranodon Ventures. Boeing | Insitu | Wall Street Journal (subscription reqd).

June 2/08: Boeing received an estimated \$65 million indefinite-delivery/ indefinite-quantity contract to «provide persistent Unmanned Aerial Vehicle Intelligence, Surveillance, Reconnaissance services supporting the Global War on Terror, Operation Iraqi Freedom and Operation Enduring Freedom sea-based deployments and land-based detachments.» The language above refers to their ScanEagle operation services, which are undertaken in cooperation with Insitu.

Work will be performed in Bingen, WA, (65%); and St. Louis, MO (35%) and is expected to be complete in May 2009.

Contract funds in the amount of \$7 million will expire at the end of the current fiscal year. This contract was competitively procured by electronic request for proposals, with 2 offers received (N00019-08-D-0013). Boeing release | Insitu copy.

May 28/08: The NanoSAR test program continues, as Boeing, ImSAR and Insitu Inc. achieve real-time processing of Synthetic Aperture Radar (SAR) data aboard a ScanEagle UAV which is also equipped with a standard inertially stabilized electro-optical (EO) camera. The tests marked the first time SAR and EO capabilities have flown together on such a small, lightweight platform, and involved real-time SAR processing with streaming radar images displayed on the ground station. Creating real-time images onboard ScanEagle eliminates the requirement of either processing imagery on the ground after flight or using high-speed data links to a ground station.

May 26/08: Insitu, Inc. partners with the Queensland state government in Australia to announce the formation of its wholly owned subsidiary, Insitu Pacific Pty Ltd. The release adds that:

«Insitu, along with Boeing Australia, is proud to be part of the experienced team that has delivered more than 13,000 surveillance and reconnaissance flight hours to help protect Australian troops in Iraq and Afghanistan.»

April 29/08: Insitu announces that the ScanEagle has now surpassed 50,000 combat flight hours with the U.S. Marine Expeditionary Forces (MEF) in Iraq and 1,000 shipboard recoveries with the U.S. Navy.

April 22/08: Insitu announces that it has flown Heavy Fuel Engine (HFE) equipped ScanEagles in Iraq, in cooperation with the US Navy. Heavy fuel refers to the kerosene-based fuel used in diesel and/or jet aircraft engines such as JP5, JP8, or Jet-A. ScanEagles flying in Iraq are using naval JP5 fuel, which is designed to be safer aboard ships.

The effort involved Insitu, Boeing, and Sonex Research Inc. in Annapolis, MD. The effort took 2 years of development and included over 2000 hours of testing, including a new ScanEagle flight endurance mark of 28 hours, 44 minutes using JP5.

April 18/08: Recall the Feb 7/08 launches from a Navy SEAL MkV boat, and demonstration by AFSOC at Hurlburt Field, FL. Insitu Group, Inc., of Bingen, WA receives a firm-fixed price contract with a not-to-exceed value of \$24 million for

unmanned aircraft system information gathering, target surveillance, and reconnaissance services in support of U.S. Special Operations Command. The work will be performed in Bingen, WA and 3 other undisclosed locations using FY 2008 operations and maintenance funds (H92222-08-C-0022).

Feb 7/08: Air Force Special Operations Command, as the lead command for small unmanned aircraft systems, highlights the capabilities of the Scan Eagle during a demonstration at the Eglin Air Force Base test range. AFSOC has been training with the 820th Security Forces Group from Moody Air Force Base, GA since September 2007, to employ the system.

Feb 7/08: A Scan Eagle unmanned aerial vehicle is launched from a MK V naval special warfare boat off the coast of San Clemente Island. This is the first time a Scan Eagle, used for various applications such as intelligence gathering and battle damage assessment, has been launched from this kind of platform.

Jan 14/08: Jane's reports that:

«Industry rivals are waiting to hear if they have ousted the Boeing/Insitu ScanEagle unmanned aerial vehicle (UAV) from its role as provider of intelligence, surveillance and reconnaissance (ISR) support for US Navy ships at sea. A decision on the interim Unmanned Aerial Systems (UAS) contract, which will provide ISR imagery services to warships and to the US Marine Corps into the next decade, is expected in late January or early February 2008.»

Other competitors are thought to include AAI Corporation's long-endurance Mk 4 Aerosonde, Aurora Flight Sciences' vertical take-off and landing GoldenEye 80, BAE Systems' Skylynx II, MTC Technologies' Spyhawk T-16 and Raytheon/Swift Engineering's Killer Bee.

UPDATE: the decision took until June 2008, and ScanEagle won.

Jan 7/08: Boeing, Insitu, and ImSAR conduct a successful flight-test for the tiny NanoSAR Synthetic Aperture Radar aboard a ScanEagle UAV. The NanoSAR is a 2-pound system about the size of a shoebox, which is a couple orders of magnitude lighter than most SAR systems. As a sign of the times, «import to Google Earth» is an option for the system. As a comparison, the I-Master SAR aboard Britain's new Watchkeeper UAVs is considered small at 65 pounds. SAR radars aren't an all-purpose replacement for ScanEagle's existing electro-optical sensors, but they're a very important complement because of their ability to see through fog, dust, et. al. The issue for NanoSAR will be providing acceptable resolution and coverage despite its tiny size. Targets for the 1.5 hour test flight at the Boardman, OR test range included vehicles, structures and corner reflectors. Data collection worked as planned, and SAR imagery was later created on the ground. The next step in flight testing will be to create imagery aboard the UA in real time.

CARRIER UCAVs: THE RETURN OF UCAS

Defense Industry Daily, USA

www.defenseindustrydaily.com

July 27, 2008

In January 2006, DID noted the uncertain future of the J-UCAS program, which aimed to create Unmanned Combat Aerial Vehicles (UCAV) for the USAF and Navy that could approach the capabilities of an F-117 stealth fighter. Boeing's X-45C was set to face off against Northrop Grumman's X-47B Pegasus, the program had demonstrated successful tests that included dropping bombs, and aerial refueling tests were envisioned.

J-UCAS was eventually canceled, but the technologies have survived, and the US Navy remains interested. In May 2007, «CSBA on Future US Naval Aviation: Unmanned, Too?» highlighted a non-partisan report that discussed at the lengthening reach of ship-killers. Meanwhile, the US Navy's carrier fleet sees its strike range shrinking to 1950s distances, and prepares for a future with 11 operational carriers – but just 10 carrier air wings. Could UCAV/UCAS vehicles with longer ranges, and indefinite flight time limits via aerial refueling, solve these problems?

Some people in the Navy seem to think that they might. Hence UCAS-D, which now has its official jet engine...

The UCAS-D Program

In July 2007, Northrop Grumman's X-47B Pegasus beat Boeing's X-45C to win the UCAS-D development contract. Northrop Grumman's Aug 3/07 release describes their mission as: «The UCAS-D effort will mature critical technologies, reduce unmanned air system carrier integration risks and provide information necessary to support a potential follow-on acquisition milestone.»

Pratt & Whitney Canada JT15D-5C turbofan engine powered previous X-47 models, but the UCAS-D will adopt Pratt & Whitney's F100-PW-220U, a modified variant of the engine that powers American F-16 and F-15 fighters. The UCAS-D's subsonic design and carrier-based employment change the engine's requirements; it will produce less thrust than its counterparts (16,000 lbs.), while receiving an improved ability to survive in a corrosive salt water environment.

The first X-47B Pegasus UCAS-D is scheduled to fly in late 2009. It will begin a series of detailed flight envelope and land-based carrier integration and qualification events beginning in 2010, with the first actual at-sea carrier landings planned for late 2011. Follow-on analysis and program completion will take place in 2012-2013.

Palmdale, CA is the final assembly site for the X-47B, and the industrial team also includes Lockheed Martin, Pratt & Whitney (engine), GKN Aerospace, GE Aviation, Honeywell, Eaton Aerospace, Moog Inc., Wind River, Goodrich, Parker Aerospace, Dell, Hamilton Sundstrand, and Rockwell Collins.

Contracts and Key Events

Unless otherwise indicated, The Naval Air Systems Command Patuxent River, MD issued the contracts.

July 14/08: Pratt & Whitney announces a \$54 million contract from Northrop Grumman to develop and integrate the X-47 UCAS-D's engine and exhaust system. The Pratt & Whitney F100-PW-220U engine will power the UCAS-D, providing up to 16,000 pounds of thrust while operating in a maritime environment, including carrier deck operations.

August 1/07: Northrop Grumman Integrated Systems – Western Region in San Diego, CA received a \$635.9 million cost-plus-incentive-fee contract for the Unmanned Combat Air System CV Demonstration Program (UCAS-D). Work will be performed in Rancho Bernardo, CA (38%); El Segundo, CA (29%); Palmdale, CA (13%); East Hartford, CT (7%); Jupiter, FL (2%); Nashville, TN (2%); Hazelwood, MO (1%), and various locations within the United States (8%), and is expected to be complete in September 2013.

The purpose of the UCAS-D is to demonstrate critical CV suitability technologies for a stealthy air vehicle in a relevant environment [DID: i.e naval/ aircraft carriers]. Expected deliverables include trade studies, analyses, software, reports and flight test data. This contract was competitively procured through a request for proposals; 2 firms were solicited [DID: that would be Boeing and NGC] and 2 offers were received (N00019-07-C-0055). See also Northrop Grumman's Aug 3/07 release.

Sept 28/05: As part of DARPA's J-UCAS program, Northrop Grumman Corporation's X-47B conducted a successful simulated exercise at the Naval Air Warfare Center Weapons Division in China Lake, CA. It demonstrated the simultaneous control of 4 of its X-47B unmanned aerial vehicles (UAVs) during U.S. Navy aircraft carrier operations. See Dec 9/05 NGC release.

Using a surrogate aircraft which represented one X-47B, 3 additional simulated X-47B aircraft were successfully controlled during several flights using advanced mission-management software and air traffic control procedures currently used by Navy aircraft carriers. The air traffic controller provided standard commands to a single mission operator, who in turn ensured all four aircraft safely operated within the simulated carrier's airspace. The controller had to demonstrate the ability to guide all 4 aircraft through approach, wave-off and traffic pattern procedures, while accomplishing proper spacing and air traffic de-confliction. The mission operator had to be able to monitor the entire process to ensure proper command response, and advise the controller on aircraft response or performance limitations. This was one of many tests undertaken as part of J-UCAS. It is reproduced here for its ongoing relevance to the UCAS-D program.

NORTHROP GRUMMAN SELECTS SPRAYCOOL MPE FOR MQ-1 PREDATOR**Military & Aerospace Electronics, USA**<http://mae.pennnet.com>**July 29, 2008**

SprayCool, maker of thermal management and environmental isolation products for military, aerospace, and industrial applications, won a contract from Northrop Grumman Corporation's ISR Systems Division to provide its liquid-cooled enclosures for the U.S. Air Force Airborne Signals Intelligence Payload 1C (ASIP-1C) program.

The SprayCool enclosures will house signals intelligence electronics for the Air Force's SIGINT-equipped MQ-1B Predator Unmanned Aircraft System (UAS), in support of Predator's tactical warfighting role, sometimes described as a hunter/killer/scout mission. Under this contract, the SprayCool Multi-Platform Enclosure (MPE) was selected by Northrop Grumman as a critical component in the ASIP-1C sensor payload for SIGINT-equipped Predator aircraft. SprayCool's enclosure enables Northrop Grumman and the Air Force to leverage their previous investments, allowing them to use the same electronics as on the baseline ASIP program on other platforms. The MPE provides environmental isolation for the system, and manages operating temperatures for the computing electronics in extreme environmental conditions. Similar to the variant SprayCool ASIP enclosure flying aboard the U-2 and Global Hawk platforms, SprayCool's scalable enclosure will be deployed on Predator using a 9-slot configuration. «This award is a direct result of the performance of our SprayCool enclosures onboard the U-2 and Global Hawk aircraft. The selection of SprayCool for the Predator UAS further validates the effectiveness of our solutions, and positions us for similar applications for upcoming DOD airborne ISR programs where existing and new electronics components can be packaged together and deployed more quickly.» said Matt Gerber, SprayCool's President and Chief Executive Officer.

SprayCool's patented two-phase liquid cooling technology uses a fine mist of non-corrosive, non-conductive liquid, sprayed in a thin layer, which evaporates and cools electronics. The process continuously cycles within a sealed, closed loop system. In doing so, SprayCool products isolate the electronics from dirty, corrosive environments found in military and industrial applications resulting in cooler, higher performance, and more durable electronic devices. The technology provides an efficiently controlled and isolated environment for a broad mix of electronics in a package that is significantly smaller, lighter, and more power and cost efficient, and faster to deploy by the integrator.

The SprayCool MPE enclosures will be delivered to Northrop Grumman in 2008.

NORTHROP GRUMMAN TO DEVELOP PERSISTENT SURVEILLANCE PAYLOAD FOR UAVs

Space War, USA

www.spacewar.com

July 29, 2008

Northrop Grumman has been awarded a contract by the U.S. Office of Naval Research to develop and demonstrate a signals intelligence (SIGINT) payload for use on an unmanned aerial vehicle (UAV) under the Warfighter's Tactical SIGINT Resource (WTSR) program.

«In today's battlespace environment, persistent surveillance is key,» said Fred Bean, WTSR program manager.

«Tactical units must rapidly and reliably use sensor networks to track potential targets; collect, send and receive actionable intelligence; and automatically receive warning of impending dangers. The WTSR program is aimed at providing expeditionary forces with that kind of enhanced battlespace awareness. We look forward to providing our expeditionary fighting forces with the right data and the right amount data at the right time.

«Tactical units at the lowest echelon currently receive little to no intelligence of value because they have very few - if any - ISR assets under their direct control. The WTSR program will help to overcome that problem as well as a number of other key limitations associated with conventional sensor technology,» he said.

The Navy's objective is to provide small unit tactical forces with the sensing and tracking capabilities needed to conduct warfare against an asymmetric threat. The program focuses on developing significant technological advances in three key areas: sensors; tags and taggants; and network communications that integrate unmanned vehicles and unattended ground sensors into the net-centric battlefield.

Under the three-year, \$5.2 million contract, Northrop Grumman will first develop a low-cost, lightweight, plug-and-play SIGINT sensor package that requires minimal power. The sensor will be equipped with flight-unable receivers that enable rapid re-tasking of the SIGINT payload during flight operations. Once developed, Northrop Grumman will conduct a Tier II/Class II tactical UAV flight demonstration of the SIGINT payload at an operational altitude of 3,000 feet.

The WTSR contract was awarded by the Office of Naval Research's Expeditionary Maneuver Warfare and Combating Terrorism department as part of the FORCEnet Science and Technology - GWOT Focused Tactical Persistent Surveillance program. Northrop Grumman will lead the effort from its Ft. Wayne, Ind. facility and is teamed with Swift Engineering, Inc., San Clemente, Calif. Other Northrop Grumman work on the program will be accomplished in Sacramento, Calif., and in Cincinnati.

AIRVENTURE FORUM ON UNMANNED PLANES IN NAS NOT A CROWD FAVORITE

A Lesson In Patience, And Due Process... But Is Anyone Listening?

By Valentino Valencia

Aero-News, USA

www.aero-news.net

July 30, 2008

A beautiful opening day at Oshkosh, and it's about 4:10 pm. I'm late for my last forum of the day. This forum deals with unmanned aircraft in the NAS, and is a subject that I'm really interested in, as someone who works with UAVs.

As I walk into the pavilion - located next to the flight line - I notice there are only eight people in attendance. No wait, there are 9 people. Oh wait, he was just turning a chair around so he can watch the air show with the 14 people standing next to the pavilion doing the same thing.

Needless to say, this forum was provided at a time when there was definitely more interesting things going on. And every time one of those interesting things flew by, forum speaker Michael Gallagher had to stop. Not because it was so interesting, but because the noise was so overwhelming.

Michael is a former Manager of the FAA Small Airplane Directorate and has been very involved in general aviation issues since 1987. He is also a member of the leadership group of RTCA SC-203, which is developing standards for sense and avoid and communication and control for unmanned aircraft systems.

RTCA stands for Radio Technical Commission for Aeronautics, and the standards that they are developing will be submitted to the FAA for approval. At the request of AOPA and the FAA, Special Committee 203 (SC-203), was formed to help integrate Unmanned Air Vehicles (UAV's) safely into the NAS.

The first of several steps for SC-203 is to develop an Operational Services and Environment Description (OSED). Because UAV's come in a wide variety of shapes and sizes, and different mission profiles, SC-203 needs to be able to distinguish these different platforms and label them accordingly. The OSED is scheduled to come out later this year. What does this mean for GA? This means that you still have a voice. Anything that is submitted by SC-203 has to go through an approval process through the FAA. This is where you can express your opinion.

UAVs have a valid and important role to play in the future... and it seems that integration into the NAS is important, and inevitable. Although the attendance was small and the venue was poor (for now), this is a subject matter that is going to get increasing coverage in the future and will eventually affect everyone that uses the NAS.

Even though SC-203 is there to ensure that UAV's «do no harm» to existing NAS users, every user of the NAS should stay informed of upcoming issues that affect their way of life.

TROOPS OUT, DRONES IN **Policing the world with remote-controlled aircraft**

By William Saletan
Slate, USA

www.slate.com

July 30, 2008

Client states can be so annoying. You can't get them to police terrorists along their borders; you can't get them to countenance publicly your troops inhabiting their country. So when you can't be there in the flesh - and you can't persuade your ally to help - the next-best thing is to be there in the nonflesh. Send in the drones.

That's what we've been doing in Pakistan. Remotely operated American unmanned aerial vehicles have been hunting and killing al-Qaida and Taliban honchos there for years. Six months ago, we took out a high-level al-Qaida commander. Monday morning, we took out another. After complaining for weeks that Pakistan isn't doing the job, we took care of it ourselves, killing a top al-Qaida trainer and weapons expert with missiles fired from a «remotely piloted aircraft.» In an interview with Reuters, a local tribesman identified the killers: «We had heard the sound of a drone engine just before the explosions. These drones have been flying since late Sunday night.»

Drones, as I've said before, are the future of warfare. The tactical reason is that they don't bleed. They let us hunt enemies abroad at no risk to ourselves. The political reason is slightly different: They spare us the difficulties of an official troop presence. Pakistan's government doesn't have to approve or explain our incursion into northwest Pakistan on Sunday night, because, strictly speaking, we weren't there.

The U.S. military doesn't even control our killer drones over Pakistan. The CIA does. This doubly insulates the Pakistani government from responsibility. «The Pakistani military, as is its custom, denied knowledge of the missile strike and whether it had been carried out by the United States,» the Los Angeles Times reports. «One U.S. official familiar with the incident said the Pentagon was not involved and that 'it was an agency-run op all the way.'»

That deniability came in handy Monday morning, when Pakistan's prime minister met with President Bush at the White House a few hours after the killer-drone attack. Here's a lovely picture of them standing together on the South Lawn. «Pakistan is a strong ally and a vibrant democracy,» the president declared. «The United States supports the democracy and supports the sovereignty of Pakistan.» The prime minister proudly agreed. He said of the insurgents on his border, «This is our own war.» An hour later, reporters asked Bush's press secretary about the missile strike. «I'm not able to comment,» she replied. They ask three more times. She repeated her nonanswer.

So that's our M.O. in Pakistan. And guess how we're going to patrol Iraq after we «pull out»? That's right: with drones. According to the New York Times, Iraqi leaders and American politicians of both parties agree that there are three critical military tasks the Iraqi forces still cannot fulfill: providing combat support and logistics, carrying out high-tech surveillance and conducting close-air support for combat missions. So American forces can be expected to perform those three requirements for the foreseeable future.

Lt. Gen. Gary North, commander of allied air forces in the Middle East, tells the Times that he plans to «complement our manned airplanes with an increased amount of unmanned attack platforms.» In fact, the transition is already underway: For the first time in Iraq, the Air Force is flying missions this month with the new Reaper, a large remotely controlled vehicle that carries not only advanced surveillance sensors, but also bombs and missiles comparable to those on top-of-the-line piloted fighters. Not only do Reaper pilots sit in a trailer at a safe distance from the front lines, but the vehicles require less refueling and thus can stay aloft for long periods, so the number of airborne tankers would diminish as Reapers take on a growing role. «The capability that I am providing comes at less manpower on the ground,» General North said. That's our future in Pakistan, Iraq, and the next theater of war: less manpower on the ground, more unmanned power in the sky. We promised to pull out our troops. We didn't promise not to replace them.

US AIRFORCE TO LAUNCH ROBOTIC SPACE SHUTTLE 2.0 THIS YEAR

Winged spaceplanes not dead, just unmanned

By Lewis Page
The Register, UK

www.theregister.co.uk

July 31, 2008

NASA may have given up on spaceplanes for now, with the Shuttle soon to be replaced by old-school rocket stacks and capsules. But the US Air Force, it seems, still sees a need for spacecraft which can re-enter atmosphere and make a runway landing. Reports indicate that the X-37B unmanned spaceplane demonstrator will make its first orbital launch in November under USAF auspices.

According to *Aviation Week*, the «Orbital Test Vehicle» - built by Boeing's «Phantom Works» advanced-projects bureau - will be launched atop an Atlas V booster package from Cape Canaveral, taking a launch slot previously filled by a NASA moon reconnaissance mission.

The X-37 programme was originally begun by NASA and the Phantom Works in 1999. It was aimed at producing a new generation of orbital spaceplanes, and its immediate justification at the time was the eventual provision of a «lifeboat» landing craft for astronauts on the International Space Station. Various experiments were carried out, involving the

release of test airframes from high-flying jets and helicopters, and NASA originally planned to carry out an orbital flight of an unmanned prototype in 2006. The X-37 plans drew heavily on the USAF's X-40 experiments, and it was planned that the more sophisticated X-37 space vehicle would be able to stay in orbit for 21 days.

NASA no longer has any near-future spaceplane plans, but the X-37B «reusable unmanned space test platform» project has been kept going by Boeing with Air Force money. Boeing have previously said that the USAF's objectives are «concept of operations development for reusable space vehicle technologies», and that orbital tests would commence this year. This latest news seems to confirm that schedule.

Just why the Air Force thinks it needs orbital landers isn't clear, but such craft could be one option for America's desired «prompt global reach» capability. Rather than using hypersonic airbreathers ripping through the atmosphere to reach a target, the US forces might choose to send its payloads still faster, through the vacuum of low orbit. Future orbiters derived from the X-37 might deliver warheads, spy packages or even troops to far-flung theatres within hours of getting the go order, although they'd never be able to get back again.

Returning to the present day, the X-37 isn't anything like the size of a space shuttle - about 27 feet long and with a wingspan of 15 feet. However, it's supposed to be a significant advance on Shuttle technology, with a «highly durable high-temperature thermal protection system» just one of «approximately 30 airframe, propulsion and operation technologies» to be tried out. There's also a 7 foot x 4 foot payload/experiment bay.

With the demise of the Shuttle, the X-37 - small and unmanned though it is - will be the only true, orbital spaceplane in operation, though Europe's «Phoenix» programme is proceeding on similar lines. There are also various sub-orbital jobs planned for the nascent space tourism industry, similar to the SpaceShipOne of Ansari X-Prize fame, but these merely zoom ballistically out of the atmosphere before falling back in again - they can't achieve the speeds needed to go into a sustainable orbit.

Those who would like to see a future of reusable space vehicles will find today's news some comfort, in a world where launch technology can sometimes seem to be taking retrograde steps rather than advancing.



The X-37 unmanned minishuttle
as NASA saw it.

Facilitating Access To Global UVS Information

The electronic **UVS News Flash** is produced by Blyenburgh & Co for UVS International and is supplied **free-of-charge** by email. The UVS News Flash has as purpose to help raise the level of global awareness relative to ongoing research & development, relevant technologies, production and sales, as well as current & future applications of unmanned vehicle systems (UVS) (air, ground & naval), by making existing published information available to a wider readership.

SOURCE MATERIAL

The following **UVS International media partners**:

- Aerospace & Defence Network, The Netherlands
- Armada International, Switzerland
- Avionics Magazine, USA
- Canadian Defence Review, Canada
- Defence News, USA
- Frontline, Canada
- Jane's Defence Weekly, UK
- Jane's Navy International, UK
- Strategie & Technik, Germany
- TTU, France
- Asia Pacific Defence Reporter, Australia
- Armed Forces Journal, USA
- C4ISR Journal, USA
- Defence Management Journal, UK
- Fantassins, France
- Flight Tech Online, USA
- Jane's International Defence Review, UK
- Military Technology, Germany
- Training & Simulation Journal, USA

have authorised UVS International to include the relevant articles that they publish in the weekly UVS News Flash. The aforementioned media partners are sincerely thanked for their cooperation.

In addition, the UVS News Flash contains press releases submitted by industry (UVS International members, as well as non-members) and regulatory and government authorities (military & civil). Multiple articles are also searched for on the web. In all cases the source of the information, the name of the author (if applicable) and the date of publication, as well as the publication's web site, are indicated.

For security reasons, many of the recipients of the UVS News Flash cannot access web sites from their office computers. Therefore, the UVS News Flash does not rely on supplying links to various web sites where information can be found, but proposes the entire text of the relevant articles & press releases.

LANGUAGE All articles in the UVS News Flash are in English.

CIRCULATION

The UVS News Flash is distributed every two weeks by email to a qualified readership of more than **6 000 persons** in **68 countries** directly involved with unmanned vehicle systems. Many of these recipients forward the News Flash on to others within their organizations, which substantially increases the News Flash circulation. All UVS News Flashes are posted on www.uvs-info.com

GETTING ON THE RECIPIENTS LIST

Registration on www.uvs-international.org or www.uvs-info.com by qualifying entities automatically assures being inserted on the email listing used to send out the publication.

QUALIFIED READERSHIP

The qualified recipients of the UVS News Flash consist of: UVS International members, government, military, diplomatic and international organization representatives, regulatory authorities, researchers, academia, as well as partner organizations and associations.

SUBMISSION OF PRESS RELEASES & ARTICLES

All recipients of the UVS News Flash are encouraged to supply UVS International by email with their press releases & announcements. All recipients are also encouraged to forward the UVS News Flash to their contacts & relations. Publications (printed & electronic press) interested to have their relevant articles included in the UVS News Flash are requested to contact UVS International (info@uvs-international.org).

ADVERTISING RATES

The advertising rates have been kept extremely reasonable in order to make advertising in this medium also possible for small and medium sized companies. The UVS News Flash is without doubt the most cost effective way possible for an advertiser to regularly get his message out to the targeted international unmanned vehicle systems community.

2008 UVS NEWS FLASH ADVERTISING RATES

		Rates in Euro excl. VAT	Cost per insert in Euro excl. VAT	Applied Discount
Positions:				
2nd & following pages only (cover page is not available for advertising)				
Full page advertisement in	- 4 consecutive issues	1 000	250	
	- 8 consecutive issues	1 800	225	-10%
	- 12 consecutive issues	2 544	212	-15%
	- 24 consecutive issues	4 800	200	-20%
	- 48 consecutive issues	8 976	187	-25%
Half page advertisement in	- 4 consecutive issues	548	137	
	- 8 consecutive issues	984	123	-10%
	- 12 consecutive issues	1 404	117	-15%
	- 24 consecutive issues	2 640	110	-20%
	- 48 consecutive issues	4 944	103	-25%

Note: Orders for less than 4 consecutive insertions will not be accepted.

19,6% VAT will be due by companies established in France.

Euro 1 = US\$ 1,50 (for indicational purposes only; the exchange rate may vary from day-to-day)

Agency Commissions	Indicated advertising rates do not include any commissions for agencies. If an agency commission is required, such commission should be added to the indicated prices.
Invoice Currency	All invoices will be issued & must be paid in Euro .
Advertisement Booking	In order to be valid, advertisement bookings must be made by completing and signing the News Flash Advertisement Booking Form. The completed form is to be transmitted by post or fax to Blyenburgh & Co. Bookings will be legally binding after written booking confirmation by means of an official invoice sent by the Publisher.
Payment Deadline	A booked advertisement will only be published after receipt of payment.
Publication Dates	The UVS International News Flash is published & emailed out Saturday or Sunday every two weeks.
Copy deadline	The advertisement copy is to be received by Blyenburgh & Co on the Tuesday preceeding the Saturday on which the News Flash in which the advertisement is to be placed will be published.

ADVERTISEMENT COPY INSTRUCTIONS

- The advertisements can be submitted in JPEG, Photoshop, Illustrator or PDF format. Please note that we operate in a PC environment.
- The advertisements should have the following sizes:
 - Full page advertisements : 238 x 164 mm (height x width);
 - Half page advertisements : 119 x 164 mm (height & width).
- The advertisement file should have the lowest possible resolution acceptable for screen reading & printing; 72 dpi is suggested.
- Advertising copy files are to be sent to Blyenburgh & Co by email at rc@uvs-info.com & pvb@uvs-info.com.
- The advertising copy for each insertion may be different.
- For further questions relating to the supply of your advertising artwork, please contact Blyenburgh & Co.

ADVERTISING CONTACT

Russ Curry

Tel.: 33-1-47.43.01.98 - Cell: 33-6-07.16.72.02 - rc@uav-info.com

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In these Terms & Conditions «the Publisher» means Blyenburgh & Co; «the Advertiser» means the advertiser or its agent, whichever is the principal; and «Advertisement» means the advertising space booked by the Advertiser.

- 01 The receipt of the signed advertisement booking form by the Publisher constitutes a binding contract.
- 02 Unless otherwise stated, fees payable to the Publisher for Advertisements are stated exclusive of VAT (which shall be payable in addition). VAT will only be charged to Advertisers established in France.
- 03 Unless otherwise expressly agreed in writing, all invoices will be issued in Euro and will be payable in accordance with the payment instructions indicated on the invoice.
- 04 All cheques must be in Euro and be made payable in France to the Publisher and sent to the Publisher at the address appearing on the invoice.
- 05 The Advertiser shall submit to the Publisher suitable Advertisement copy by the due date notified by the Publisher. If such copy has not been received by such date, the Publishers may refuse the Advertisement and may reproduce material already held from the Advertiser, or may print the name and address of the Advertiser in place of the Advertisement, and the Publisher shall not be responsible for any mistake, error, or omission in such copy.
- 06 The Advertiser shall supply to the Publisher all necessary artwork to reproduce the Advertisement. Supplementary processing costs incurred by the Publisher will be charged to the Advertiser where artwork is not supplied in the specified form. The Publisher may stipulate special charges and conditions for special Advertiser requirements.
- 07 Cancellations can be accepted only if received in writing not later than 7 days prior to the publication date. Cancellations received after this date are subject to a 50% adjustment fee.
- 08 Special positions are given only if agreed to in writing by the Publisher. An additional charge may be levied.
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- 10 The Publisher reserves the right to refuse or cancel any Advertisement without any reason or notice, (returning any money paid).
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- 12 The Publisher reserves the right to alter or postpone the publication date.
- 13 The Publisher cannot take any responsibility for the accuracy of copy given verbally to the Publisher. Publisher is not responsible for any misspellings or other errors in advertisements.
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- 16 The Publisher is not responsible for any loss howsoever occasioned, as a result of delay or failure to publish this publication.
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- 18 The Advertiser must notify the Publisher in writing of any complaints it has or receives regarding the Advertisement within twenty eight (28) days of the relevant publication date.
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- 20 Notwithstanding aforementioned §19, if notification of receipt of payment of an advertisement booked has not been received by the Publisher from his bank 3 days prior to the publication date, the relevant advertisement will not be published.
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- 22 Should the Advertiser or its agency fail to supply Advertisement material of an acceptable standard or instructions by the specified copy deadline, then the Publisher reserves the right to charge the full cost of the Advertisement booked.
- 23 The Publisher may charge to the Advertisers' or its agency's account the cost of enforcing any of its rights against the customer for non-payment of outstanding debts in accordance with the Publisher's terms, including any expenses incurred by reason of the customer's breach of these conditions. Should the Publisher refer an outstanding account to either a debt collection agency or solicitors for collection, then any possible future business to be transacted with that customer will be entirely at the discretion of the Publisher.
- 24 These terms and conditions contain all the terms of the order and no other terms will be incorporated into the order. The order is in respect of the Advertisement only, and is not dependent on any other terms.
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